FISHERY MANAGEMENT INVESTIGATIONS

FEDERAL AID IN FISH RESTORATIONS
1994 JOB PERFORMANCE REPORT
PROGRAM F-71-R-19

Steven M. Huffaker, Director

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS
UPPER SNAKE REGION (Subprojects I-G, II-G, III-G, IV-G

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1994 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-19

Project I: Surveys and Inventories | Subproject I-G: Upper Snake Region

Job: a | Title: Mountain Lakes Investigations

Period Covered: July 1, 1994 to June 30, 1995

ABSTRACT

No mountain lakes were surveyed by Idaho Department of Fish and Game personnel in 1994. We stocked one mountain lake in the White Knob Mountains, 13 lakes in the Pioneer Mountains, and three lakes in the Lost River Range. In the 17 lakes 21,500 total fry were planted (Table 1). We used the Challis National Forest fire standby helicopter (jet Llama) at no cost to the Department to stock all lakes on September 7, 1994. Ashton Hatchery personnel did not stock Horseshoe Lake in the Fall River highlands in 1994 due to unavailability of Arctic grayling *Thymallus arcticus* fry.

We also updated the three-year rotation stocking schedule to reflect current angler use, to adjust for carrying capacity, and to make more efficient use of flight time (Table 2). This was done in conjunction with Bart Gamett, U.S. Forest Service, Lost River Ranger District. Results of a trailhead user survey also conducted by Bart Gamett are included in Appendix A.

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Table 1. Mountain lakes in Upper Snake Region stocked with fry, 1994.

Lake name	IDFG catalog #	Number stocked	Species[a]
White Knob Mountains			
Grant Creek	15-0153	1,000	RB
Pioneer Mountains			
Boulder	15-0156	2,000	RB
Washington	15-0158	1,000	RB
Kane Canyon	15-0208	1,000	CT
Airplane	15-0162	2,000	RB
Arrowhead	15-0160	2,000	RB
Surprise Valley #2 (1)[b, c]	15-0163	1,000	RB
Betty	15-0198	3,000	CT
Baptie	15-0200	not stocked	GR
Goat	15-0202	1,000	CT
Bench	15-0196	1,000	CT
Clear[b]	15-0194	500	CT
Bellas #1	15-0175	1,500	CT
North Fork Bellas	15-0176	not stocked	GR
Bobber	15-0131	500	CT
Iron Bog #2[b]	15-0132	not stocked	GR
Horsethief[b]	15-0138	not stocked	CT
Lake Creek #13 (1)[c]	15-0189	1,000	CT
Lost River Range			
Upper Swauger	15-0120	1,500	CT
Lower Swauger	15-0121	500	CT
Shadow #1	16-0117	not stocked	CT
Shadow #2	16-0118	1,000	RB
Total: Cutthroat		11,500	
Rainbow		10,000	
Grand Total:		21,500	

[a] RB=rainbow trout *Oncorhynchus mykiss*; CT=cutthroat trout *Oncorhynchus clarki*; GR=Arctic grayling *Thymallus arcticus*.

[b] Recommended to be discontinued.

[c] Naming error from previous reports in parenthesis.

Table 2. Three-year rotation schedule for mountain lake supplemental trout stocking in the Upper Snake Region. CT=cutthroat; RB=rainbow; GR=grayling; GN=golden *Oncorhynchus aguabonita*.

Catalog number	Lake	Last stocked			To be stocked		
		Year	Species	Number	Year	Species	Number
Fall River Highlands							
12-0114	Horseshoe	1993	GR	2,000	[a]	GR	2,000
Pioneer Mountains							
15-0183	Big	1992	CT	3,000	1995	CT	3,500
15-0186	Rough	1992	CT	1,000	1995	CT	2,500
15-0187	Long	1992	CT	1,500	1995	RB	3,000
15-0191	Round	1992	CT	1,000	1995	GR	1,500
15-0184	Golden	1990	GN	750	1995	GN (RB)[b]	1,000
?	Lake Creek #11[c]	--[d]	--	--	1995	RB	500
15-0189	Lake Creek #13	1994	CT	1,000	1995	GR	500
15-0203	Green	1992	CT	1,500	1995	CT	1,000
15-0203	Green	--	--	--	1995	GR	1,000
15-0128	Brockie	1992	CT	1,000	1995	CT	1,500
15-0129	Iron Bog #1	1993	CT	2,500	1995	RB	3,500
15-0130	Fish Pole	1993	CT	2,500	1995	CT	2,500
15-0210	Ramey	1991	CT	?	1997	CT	500
15-0175	Bellas #1	1994	CT	1,500	1997	CT	1,500
15-0176	N Fork Bellas	1991	GR	1,000	1997	GR	500
15-0196	Bench	1994	CT	1,000	1997	RB	500
15-0194	Clear	1994	CT	500	1997	CT	500
15-0200	Baptie	1991	GR	500	1997	GR	1,500
15-0198	Betty	1994	CT	3,000	1997	CT	2,500
?	Betty #2[c]	--[d]	--	--	1997	RB	500
15-0202	Goat	1994	CT	1,000	1997	CT	2,000
15-0208	Kane Canyon	1994	CT	1,000	1997	CT	1,500
15-0156	Boulder	1994	RB	2,000	1997	CT	1,500
?	Boulder #2[c]	--[d]	--	--	1997	CT	500
15-0158	Washington	1994	RB	1,000	1997	RB	500
15-0160	Arrowhead	1994	RB	2,000	1997	CT	2,000
15-0162	Airplane	1994	RB	2,000	1997	GN (RB)[b]	1,500
?	Wildhorse #8[c]	--[d]	--	--	1997	GN[e]	500
15-0168	Angel	1990	GN	750	1997	RB	500
?	Fall Creek #1[c]	--[d]	--	--	1997	GN[e]	500
15-0132	Iron Bog #2	1990	GR	500		Discontinued	
15-0138	Horsethief	--[d]	--	--		Discontinued	
15-0131	Bobber	1994	CT	500		Discontinued	
15-0179	Bellas Canyon #2	1989	CT	650		Discontinued	
15-0163	Surprise Valley #1 or #2	1994	RB	1,000		Discontinued	

Table 2. Continued.

Catalog Number	Lake	Last stocked Year	Species	Number	To be stocked Year	Species	Number
Beaverhead Mountains							
16-0127	Divide Creek	1993	CT	1,000	1996	CT	1,000
Centennial Mountains							
16-0113	Aldous	1993	CT	775	1996	CT	1,500
16-0115	Hancock	1993	CT	275	1996	CT	500
16-0120	Salamander	1990	CT	200	1996	CT	1,000
Lemhi Range							
15-0124	Mill	1988	CT	2,000	1996	CT	2,000
15-0104	Pass Creek	1992	CT	1,000	1996	CT	1,000
Lost River Range							
15-0120	Upper Swauger	1994	CT	1,500	1996	CT	3,000
15-0121	Lower Swauger	1994	CT	500	1996	CT	500
15-0122	Big Creek	1993	RB	500	1996	RB	500
15-0116	Bear Creek	1993	RB	1,000		Discontinued	
15-0119	Copper[f]	1993	CT	1,500		Discontinued	
16-0117	Shadow #1	1990	CT	500		Discontinued	
16-0118	Shadow #2	1994	RB	1,000		Discontinued	
White Knob Mountains							
15-0181	Corral	1993	CT	2,000	1996	CT	1,000
15-0153	Grant Creek	1994	RB	1,000	1996	CT	1,000
Big Hole Mountains							
12-0102	Packsaddle	1993	CT	2,000	1996	CT	2,000
Boulder Mountains							
15-0209	Big Fall Creek	1992	CT	500	1997	CT	1,500
15-0206	North Fork	1988	CT	2,000		Discontinued	
					1995	Total[g]:	24,000
					1996	Total[g]:	17,000
					1997	Total[g]:	22,500
						Grand Total:	63,500

[a] Stock every year.
[b] Priority golden trout; if not available, stock rainbow trout.
[c] New lake for stocking; continue after evaluation.
[d] Not stocked 1968-94.
[e] Do not stock other species.
[f] Stock with self-sustaining brook trout *Salvelinus fontinalis* from Dry Creek in 1995 or 1996.
[g] Includes 2,000 GR for Horseshoe.

APPENDIX

Appendix A. Results of the 1994 trailhead user survey conducted by Bart Gamett, U.S. Forest Service, Lost River Ranger District.

Lake name	Estimates based on groups(Ang)	Groups		Visitors		Hours fished	Fish caught			Fish/ hour	Fish/angler	
		Total	Fished	Total	Fished (%)		Total	Released (%)	Kept (%)		Total	Kept
Iron Bog #1	11 (26)	40	30	180	71(39)	145.91	98	74(76)	24(24)	.67	1.38	.35
Fishpole	4 (13)	22	17	90	55(61)	106.25	81	51(63)	30(37)	.76	1.46	.54
Brockie	5 (19)	13	9	52	34(65)	97.20	27	16(59)	11(41)	.28	.79	.32
Golden	4 (17)	19	10	63	43(68)	42.50	0	0(0)	0(0)	.00	.00	.00
Big	25 (81)	63	39	242	126(52)	363.48	293	215(73)	78(27)	.81	2.32	.62
Rough	8 (33)	28	17	111	70(63)	165.75	115	111(96)	4(4)	.69	1.64	.06
Lake Creek #13	2 (3)	2	2	3	3(100)	22.00	16	16(100)	0(0)	.73	5.33	.00
Long	11 (37)	31	20	124	67(54)	150.00	87	75((86)	12(14)	.58	1.30	.19
Round	10 (38)	25	17	102	65(64)	129.63	182	177(97)	5(3)	1.40	2.82	.08
Green	22 (62)	33	31	154	87(56)	149.38	128	86(67)	42(33)	.85	1.47	.48
Star Hope	1 (3)	14	2	72	7(10)	6.75	7	7(100)	0(0)	1.00	1.00	.00
Bench	1 (6)	2	1	17	6(35)	12.00	0	0(0)	0(0)	.00	.00	.00
Baptie	7 (18)	17	11	79	28(35)	198.00	41	33(80)	8(20)	.21	1.44	.28
Goat	8 (30)	21	15	105	56(53)	247.5	216	159(74)	57(26)	.87	3.38	1.00
Betty	10 (33)	33	18	149	59(40)	123.75	241	157(65)	84(35)	1.95	4.06	1.42
Bellas #1	24 (69)	61	40	235	115(49)	292.08	250	197(79)	53(21)	.86	2.17	.46

Appendix A. Continued.

Lake name	Estimates based on groups(Ang)	Groups		Visitors		Hours fished	Fish caught			Fish/ hour	Fish/angler	
		Total	Fished	Total	Fished (%)		Total	Released (%)	Kept (%)		Total	Kept
Bellas #2	1 (1)	10	4	37	4(11)	16.00	0	0(0)	0(0)	.00	.00	.00
N. Fork Bellas	5 (12)	15	12	48	29(60)	44.40	115	94(82)	21(18)	2.59	4.00	.75
Moose #1	15 (30)	47	36	122	72(59)	134.64	288	230(80)	58(20)	2.14	4.00	.80
Angel	1 (1)	8	4	24	6(25)	9.00	72	72(100)	0(0)	8.00	12.00	.00
Boulder	7 (12)	35	15	104	26(25)	40.71	81	77(95)	4(5)	2.00	3.17	.17
Airplane	1 (1)	2	1	3	1(33)	12.00	17	17(100)	0	1.42	17.0	.00
Arrowhead	4 (13)	7	5	27	16(59)	71.25	55	54(98)	1(2)	.77	3.38	.08
Kane	4 (8)	67	14	185	36(19)	33.76	131	121(92)	10(8)	3.87	3.63	.25
Big Fall Creek	5 (10)	24	16	84	32(38)	41.60	83	80(96)	3(4)	2.0	2.60	.10
Shadow #2	1 (2)	10	1	46	2(4)	1.00	0	0(0)	0(0)	0.0	.00	.00
Swauger #2	15 (39)	27	19	87	49(56)	177.33	29	6(21)	23(79)	.16	.59	.46
Mill Creek	12 (25)	40	26	169	54(32)	115.92	87	65(75)	22(25)	.75	1.60	.40

Appendix A. Continued.

Lake name	Composition-fish/hour									
	Rainbow trout		Cutthroat trout		Brook trout		Golden trout		Grayling	
	%	Fish/ hour	%	Fish/ hour	%	Fish/ hour	%	Fish/ hour	%	Fish/ hour
Iron Bog #1	06	.04	.94	.64	--	--	--	--	--	--
Fishpole	--	--	100	.76	--	--	--	--	--	--
Brockie	20	.06	80	.22	--	--	--	--	--	--
Golden	--	--	--	--	--	--	--	--	--	--
Big	37	.30	63	.51	--	--	--	--	--	--
Rough	--	--	100	.69	--	--	--	--	--	--
Lake Creek #13	--	--	100	.73	--	--	--	--	--	--
Long	13	.07	88	.51	--	--	--	--		--
Round	--	--	95	1.34	--	--	--	--	5	.07
Green	7	.06	93	.80	--	--	--	--	--	--
Star Hope	--	--	--	--	100	1.00	--	--	--	--
Bench	--	--	--	--	--	--	--	--	--	--
Baptie	15	.03	54	.11	--	--	--	--	31	.06
Goat	11	.10	89	.77	--	--	--	--	-	--
Betty	--	--	100	1.95	--	--	--	--	--	--
Bellas #1	--	--	97	.83	--	--	3[1]	.02	--	--
Bellas #2	--	--	--	--	--	--	--	--	--	--
N. Fork Bellas	--	--	100	2.59	--		--	--	--	--
Moose #1	12	.25	--	--	88	1.89	--	--	--	--
Angel	--	--	10[2]	8.00	--	--	--	--	--	--
Boulder	58	1.16	42	.84	--	--	--	--	--	--
Airplane	--	--	100	1.42	--	--	--	--	--	--
Arrowhead	57	.44	43	.33	--	--	--	--	--	--
Kane	--	--	100	3.87	--	--	--	--	--	--
Big Fall Creek	--	--	100	2.00	--	--	--	--	--	--
Shadow #2	--	--	--	--	--	--	--	--	--	--
Swauger #2	--	--	100	.16	--	--	--	--	--	--
Mill Creek	25	.19	75	.56		-	-	--	--	--

[1] These fish were reported as rainbow trout. However, Bellas Lake #1 has no record of rainbows ever being stocked. It does have a small population of golden trout and golden/cutthroat trout hybrids. The fish reported as rainbow trout were probably immature golden trout or golden/cutthroat hybrids and were reported here as golden trout.

[2] Rainbow trout were also reported on unusable forms.

Appendix A. Continued.

Lake name	Angler responses	Method(s) used							
		Bait(%)	Fly(%)	Lure (%)	Bait/lure (%)	Bait/fly (%)	Lure/fly (%)	Bait/fly/ lure (%)	Other (%)
Iron Bog #1	11	2(18)	2(18)	2(18)	2(18)	--	1(10)	2(18)	--
Fishpole	4	--	--	2(50)	1(25)	--	--	1(25)	--
Brockie	5	--	1(20)	--	2(40)	--	--	2(40)	--
Golden	4	--	1(25)	1(25)	--	--	2(50)	--	--
Big	23	3(13)	6(26)	3(13)	3(13)	1(4)	4(18)	3(13)	--
Rough	6	--	1(17)	--	--	--	3(50)	2(33)	--
Lake Creek#13	2	--	1(50)	--	--	--	1(50)	--	--
Long	10	3(30)	3(30)	--	2(20)	--	1(10)	1(10)	--
Round	9	--	3(33)	1(11)	--	--	3(33)	2(23)	--
Green	19	2(11)	5(26)	1(5)	4(20)	2(11)	2(11)	2(11)	1(5)
Star Hope	1	--	--	--	--	1(100)	--	--	--
Bench	1	--	--	--	--	--	--	1(100)	--
Baptie	7	--	3(42)	2(29)	--	--	2(29)	--	--
Goat	8	--	4(50)	1(12.5)	1(12.5)	--	1(12.5)	1(12.5)	--
Betty	8	--	3(37)	2(25)	2(25)	--	1(13)	--	--
Bellas #1	20	1(5)	5(25)	3(15)	2(10)	1(5)	3(15)	5(25)	--
Bellas #2	1	--	--	--	--	--	1(100)	--	--
N. Fork Bellas	5	--	1(20)	1(20)	--	--	2(40)	1(20)	--

Appendix A. Continued.

Lake name	Angler responses	Method(s) used							
		Bait(%)	Fly(%)	Lure(%)	Bait/lure (%)	Bait/fly (%)	Lure/fly (%)	Bait/fly /lure(%)	Other (%)
Moose #1	15	--	9(60)	4(26)	--	1(7)	1(7)	--	--
Angel	1	--	--	--	--	--	--	1(100)	--
Boulder	7	2(29)	2(29)	1(13)	--	--	2(29)	--	--
Airplane	1	--	--	1(100)	--	--	--	--	--
Arrowhead	3	--	1(33.3)	--	--	--	1(33.3)	1(33.3)	--
Kane	4	1(25)	1(25)	2(50)	--	--	--	--	--
Big Fall Creek	5	--	3(60)	1(20)	--	--	1(20)	--	--
Shadow #2	1	--	--	1(100)	--	--	--	--	--
Swauger #2	14	4(29)	--	2(14)	2(14)	1(7)	1(7)	4(29)	--
Mill Creek	10	2(20)	--	5(50)	1(10)	--	2(20)	--	--
Total	205	20(10)	55(27)	36(18)	22(11)	7(3)	35(17)	29(14)	1(<1)

Appendix A. Continued.

Lake name	Angler responses	Responses (%)				Experience rating
		Poor	Fair	Good	Excellent	
Iron Bog #1	11	4(36)	2(19)	4(36)	1(9)	2.18
Fishpole	4	1(25)	1(25)	1(25)	1(25)	2.50
Brockie	5	--	3(60)	2(40)	--	2.40
Golden	4	4(100)	--	--	--	1.00
Big	25	1(4)	8(32)	15(60)	1(4)	2.64
Rough	6	1(17)	1(17)	4(66)	--	2.50
Lake Creek #13	1	--	--	1(100)	--	3.00
Long	11	2(18)	5(46)	4(36)	--	2.18
Round	9	1(11)	2(22)	4(45)	2(22)	2.78
Green	19	9(48)	4(21)	5(26)	1(5)	1.89
Star Hope	1	--	--	1(100)	--	3.00
Bench	1	1(100)	--	--	--	1.00
Baptie	7	2(29)	2(29)	2(29)	1(13)	2.29
Goat	7	--	1(14)	--	6(86)	3.71
Betty	9	--	--	5(56)	4(44)	3.44
Bellas #1	22	6(27)	6(27)	6(27)	4(19)	2.36
Bellas #2	1	1(100)	--	--	--	1.00
N. Fork Bellas	5	--	--	5(100)	--	3.00
Moose #1	13	--	2(15)	3(23)	8(62)	3.46
Angel	1	--	--	1(100)	--	3.00
Boulder	7	1(14)	1(14)	2(29)	3(43)	3.00
Airplane	1	--	--	1(100)	--	3.00
Arrowhead	3	1(33)	--	2(67)	--	2.33
Kane	4	2(50)	--	1(25)	1(25)	2.25
Big Fall Creek	5	--	--	3(60)	2(40)	3.40
Shadow #2	1	1(100)	--	--	--	1.00
Swauger #2	13	4(31)	5(39)	2(15)	2(15)	2.15
Mill Creek	10	3(30)	2(20)	4(40)	1(10)	2.30
Total	206	45(22)	(22)	78(38)	38(18)	2.53

1994 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-19

Project I: Surveys and Inventories | Subproject I-G: Upper Snake Region

Job: b[1] - Henrys Lake | Title: Lowland Lakes Investigations

Period Covered: July 1, 1994 to June 30, 1995

ABSTRACT

From March 1 through May 25, 1994, 11,309 cutthroat trout *Oncorhynchus clarki* (55% male) were counted and marked (right pelvic fin clip) in the Hatchery Creek spawning run at Henrys Lake. Male cutthroat averaged 490 mm and females averaged 445 mm total length. A total of 4,440,223 cutthroat eggs were collected.

A total of 3,520 hybrid (cutthroat *O. clarki* X rainbow *O. mykiss*) trout (54% male) were counted and marked (right pelvic fin clip). Hybrid males averaged 540 mm total length and hybrid females averaged 526 mm total length. A total of 2,622,200 hybrid eggs were collected in the spawning run.

From October 3 through December 12, 1994, the fish ladder was operated on Hatchery Creek for the purpose of collecting brook trout *Salvelinus fontinalis* for spawning. A trap net was deployed October 20-28, 1994. A total of 429 brook trout (36% male) were collected. Male brook trout averaged 387 mm and females averaged 414 mm total length. Brook trout green eggs totaled 527,406 from 268 females.

The 1994 population estimate of cutthroat trout larger than 350 mm in Henrys Lake was 583,401. The 1994 population estimate of hybrid trout larger than 350 mm in Henrys Lake was 228,656.

Mean total length of cutthroat trout in the creel was 418 mm with a range of 240 mm to 712 mm. The percentage of cutthroat greater than 508 mm in total length was 4.5%. Mean total length of hybrid trout in the creel was 437 mm with a range of 240 mm to 875 mm. The percentage of hybrid trout greater than 508 mm in total length was 15.2%. Mean total length of brook trout in the creel was 425 mm with a range of 310 mm to 511 mm. A total of 29% of brook trout examined in the creel were greater than 457 mm.

Angling pressure was estimated to be 177,826 hours in 1994. Idaho residents accounted for 70.7% of the total effort. Boat anglers made up 60.0% of fishermen, float tubes comprised 24.5%, and bank anglers comprised 15.5%. Bait fishing accounted for 31.5% of fishing methods, lure fishing was 42.5%, and fly-fishing comprised 26.0%.

The estimated catch was 116,796 fish. The overall season catch rate was 0.66 fish/h with an estimated season harvest of 21,008 fish. Of fish caught, 82% were released.

During the 1994 fishing season, water clarity steadily decreased. Secchi depths decreased from 6 m on May 5 to 0.5 m on September 26. This coincides with peak chlorophyll-a concentrations ranging from 16.5 to 158 μg/L. Total ammonia as N was at its highest recorded level for 1994 on October 25 at 0.324 μg/L.

Gillnetting effort consisted of one net night per location at six locations. A total of 14 cutthroat trout, 18 hybrid trout, and 2 Utah chubs *Gila atraria* were captured. Purse seining was conducted at four locations, producing 232 fish of which 168 were cutthroat trout, 61 hybrid trout, 2 brook trout, and 1 Utah chub.

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INTRODUCTION

Henrys Lake

Henrys Lake is located in the northeast corner of southern Idaho at the headwaters of the Henrys Fork of the Snake River. This 2,632 ha shallow eutrophic lake was designated a trophy trout fishery in 1976, when the Henrys Lake management program was implemented. The lake currently supports a native population of cutthroat trout *Oncorhynchus clarki*, with introduced cutthroat X rainbow hybrids *O. clarki X O. mykiss*, and brook trout *Salvelinus fontinalis*.

In 1982, the Henrys Lake Enhancement Plan was developed to offset declines in natural recruitment to the fishery due to degraded spawning habitat, fish passage barriers, and loss of naturally produced fry from tributaries to irrigation diversions. In 1985, specific goals of the Enhancement Plan and management program were refined in the 1986-1990 fisheries management plan, based on evaluation of fisheries data. In 1990 goals for Henrys Lake were further refined in the 1991-1995 fisheries management plan. This refinement would provide for an overall catch rate of 0.7 fish per hour with management goals of catch rates of 0.45 fish per hour for cutthroat, 0.15 fish per hour for rainbow x cutthroat hybrid trout, and 0.1 fish per hour for brook trout. Size goals in the creel were 20% of hybrid trout >20 in, 10% of cutthroat trout >20 in, and 5% of brook trout 18 in and over.

This report summarizes fishery investigations and spawning activities conducted at Henrys Lake during 1994 to evaluate and support various programs and management goals implemented by the Idaho Department of Fish and Game (IDFG).

OBJECTIVES

1. Describe the impact of standardized fish stocking levels of cutthroat trout, hybrid trout, and brook trout on Henrys Lake angler success and harvest.

2. Describe the population characteristics of cutthroat, hybrid, and brook trout in Henrys Lake and the effect of angling on these populations.

3. Recommend a course of action for the next five-year fisheries management plan for Henrys Lake.

METHODS

Spawning Operations

From March 1 through April 18, 1994, cutthroat trout were spawned to produce cutthroat X rainbow hybrid trout eggs and cutthroat trout eggs. Rainbow trout gametes were collected from Kamloops strain brood stock at the Ennis National Fish Hatchery in Ennis, Montana, to

produce hybrid trout. Henrys Lake cutthroat males and females were used to produce cutthroat trout to supply egg requests from various IDFG hatcheries and for return to Henrys Lake and its tributaries.

From March 1 through May 25, 1994, Henrys Lake cutthroat and cutthroat X rainbow hybrids ascended the fish ladder for counting, marking, and sorting. Each fish was anesthetized with MS-222 and checked for marks. A sub-sample of 10% of the fish was measured to the nearest 5 mm total length. Each fish was administered a right pelvic fin clip using 8-in bypass type pruning shears. Fifty to 75 percent of the right pelvic fin was removed to produce a readily recognizable mark for easy identification in the spawning run and for subsequent identification in trapnetting and the creel survey.

After spawning and marking, fish were returned to Henrys Lake via 6-in pipe. Surplus broodstock were relocated to Howard Creek, a tributary of Henrys Lake. The egg taking operation was terminated when egg requests were filled.

The fish ladder was installed on October 3 and left in operation until December 12. The trap net was installed off Hatchery Creek on October 20 and removed on October 28 due to icing. Fish were removed daily from the trap net and transported to the spawning facility. Fish entering the spawning facility from the fish ladder were sorted, measured, and spawned as stated above but were not fin clipped. There were no surplus broodstock to relocate to Henrys Lake tributaries.

Population Sampling

Trap nets were used to sample fish before the angling season to administer jaw tags for reward. Trap net mesh was 2-in BAR measure of braided knotless nylon with 100 ft leads and 36 ft wings 6 ft deep. Four trap nets were worked daily at four locations around Henrys Lake May 12-22, 1994. Fish were anesthetized, measured, and checked for identifying marks. Scale samples were taken from selected trout. Jaw tags were placed on the right lower mandible and secured by using medium sized needle-nosed pliers. Fish captured by trap net and jaw tagged were also given a left pelvic fin clip to assess tag retention. Fish were recovered in separate tanks with oxygen supplemented by air stone diffusion and portable oxygen tank. After accumulating and marking approximately 100 fish, they were transported in recovery tanks to the approximate center of the lake and released. Marking and transporting continued at each site until all fish were marked and relocated or inclement weather (wind or lightning) made watercraft operation unsafe. Unprocessed fish were released during inclement weather by opening the cod end of the trap nets and allowing fish to swim free.

Harvested fish were examined during the standardized creel survey from May 28 to October 31. They were measured to the nearest millimeter, checked for identifying marks, and species were recorded. Sex of fish was not recorded due to the difficulty in determination during the summer season. Teams of two Department personnel were stationed at each of five access sites to observe fish, interview anglers, explain the study, and recover jaw tags during the opening weekend of the fishing season. Teams were in place approximately eight hours each on the first two days of the season.

A population estimate of Henrys Lake cutthroat trout greater than 350 mm was calculated by using fish marked in the hatchery run and fish jaw-tagged by trapnetting as

marked groups. An additional estimate was made from the creel survey estimation of harvested fish divided by the estimated exploitation rate. Sample groups used to estimate abundance of fish greater than 350 mm were fish examined in the creel (season long), fish examined over opening weekend, and jaw tags returned through out the season. Separate estimates were made for cutthroat and hybrid trout. Insufficient brook trout were tagged to estimate abundance. The formula used was a modified Peterson-type as follows:

$$N = \frac{(M+1)(C+1)}{(R+1)}$$

where M is the number of fish marked
C is the catch or sample taken for census
R is the number of recaptured marks in the sample
N is the size of the population at the time of marking

Posters were placed at each access site and fish cleaning station prior to the fishing season. They described tag location, type of tag, and return instructions. Posters encouraged tags to be returned only from harvested fish to the Henrys Lake hatchery or the Idaho Falls IDFG regional office.

Gillnetting

Experimental gill nets were set at standardized locations August 1-11 for a total of six net nights. Nets were deployed at dusk and worked at dawn the following morning. Fish total length was recorded to the nearest millimeter, species recorded, and scale samples taken for age and growth analysis. High winds prevented successive night netting.

Creel Survey

A standardized roving angler survey was conducted May 28-October 31, 1994, to assess fishing pressure, catch rates, and harvest rates for trout species in Henrys Lake. Angler counts were made three times daily from watercraft. During inclement weather, counts were made from a vehicle along a prescribed route. Counts were canceled or rescheduled on limited visibility days (fog or mist) and on days when lightning threatened safety. Angler counts and interviews were randomly scheduled on 50% of weekend days, 20% of weekdays, and on all holidays.

The survey period was divided into seven intervals of 28 days duration except the first and last intervals. Interval 1 duration was three days to stratify the increased effort (approximately 20%) that occurs on the 3-day opening weekend. Interval 2 was a two-week interval because the fishing season ends on October 31.

Purse Seining

A 500 ft long, 12 ft deep, 2-in bar mesh purse seine was used to sample fish at various locations on Henrys Lake on July 7-8. The net was drawn with a skiff from the deck of a 28-ft pontoon boat into a semi-circle back to the pontoon boat. The ends of the net were drawn in using a hydraulic windlass after closing the net with a 3/8-in rope drawn through rings on the bottom of the net.

Sampling locations varied between areas of sparse, medium and dense vegetation. Fish sampled were anesthetized using MS-222, measured to the nearest millimeter (TL), identified as to species, examined for marks and returned to the lake.

Limnological Sampling

Dissolved oxygen sampling was done 320 meters east of Fremont County Park on the northeast corner of Henrys Lake on January 10, January 30 and February 18. Monitoring was done in order to develop a depletion model for 1994. This was the only site sampled because of an inordinate amount of slush on the ice at other standard locations. Dissolved oxygen was measured using a YSI model 57 oxygen meter. A gasoline powered ice auger was used to open a 25.4 cm hole in the ice, and slush was removed using an ice fishing skimmer. The initial oxygen reading was taken at the bottom of ice. The next reading was at 1 meter and then at 1 meter intervals to the bottom. The final reading was taken just up off the bottom of the lake and the depth recorded. Temperature was recorded using the oxygen meter at the same depths that oxygen was recorded. Oxygen readings were also taken on January 10 adjacent to the lake helixing system installed in August 1993. A propeller driven airboat was used to traverse weak ice to the most distant open water from shore off the mouth of Hatchery Creek (approximately 585 meters). Oxygen and temperature readings were taken at the surface and one meter intervals to the bottom, and the depth was recorded.

Beginning on May 15, Byron White of the Henrys Lake Foundation began sampling limnological parameters at four locations on Henrys Lake. Data collected included Secchi depth, chlorophyll-a, total Kjeldahl nitrogen as (N), total nitrite and nitrate as (N), total ammonia as nitrogen (N), ortho-phosphates (PO4), and total phosphorus concentrations. Samples were collected using a Kemmerer sampling tube at sub-surface, mid-water column, and just above substrate. Samples were fixed as needed and sent immediately to an analytical laboratory in Boise, Idaho for analysis. The Idaho Department of Health and Welfare, Division of Environmental Quality provided funding for this water quality study.

RESULTS AND DISCUSSION

Spawning Operations

The 1994 run consisted of 11,309 cutthroat and 3,520 hybrid trout totaling 14,829 fish (Figure 1). Cutthroat males numbered 6,209 and cutthroat females numbered 5,100. Hybrid

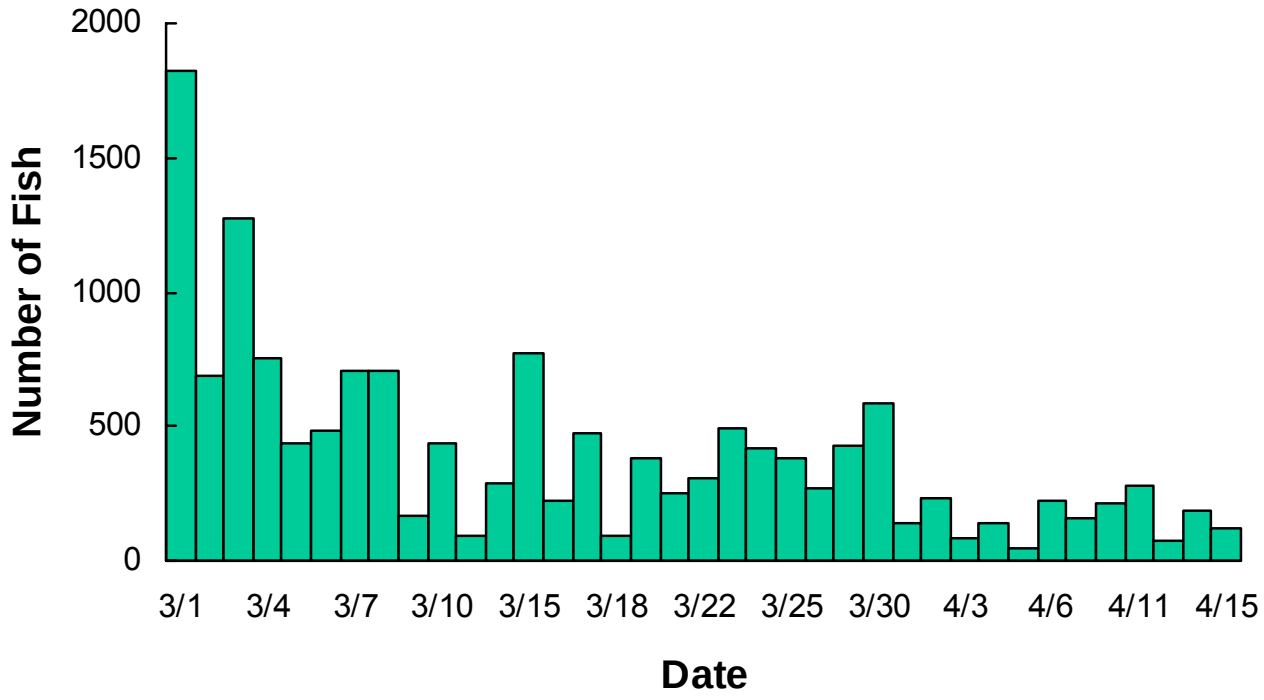

Figure 1. Run timing of cutthroat and hybrid trout (combined) at Henrys Lake Fish Hatchery, 1994.

males numbered 1,889 and 1,631 females were counted. Average length for male cutthroat was 490 mm, n=552, and females averaged 445 mm total length, n=404, (Figures 2 and 3). Combined average cutthroat total length was 441 mm. Hybrid trout males averaged 540 mm, n=217, and females averaged 526 mm, n=217, (Figures 4 and 5). Combined male and female hybrid trout average length was 533 mm total length.

Cutthroat green eggs totaled 4,440,233 from 1,765 females for an average fecundity of 2,515 eggs per female. Green egg yield was 3,330,175 eyed eggs for an eye up survival of 75%.

Hybrid trout green eggs totaled 2,622,200 from 1,020 female cutthroat for an average fecundity of 2,570 eggs per female. Eyed hybrid trout eggs totaled 1,887,984 for an eye up survival of 72%.

Brook trout were spawned during the fall of 1994. Henrys Lake level was down approximately 3 feet during early October and greatly reduced the number of brook trout using the fish ladder. Morpholine was used to imprint brook trout fry planted in previous years, and a drip system was initiated into the spawning facility on September 20. Due to brook trout not ascending the fish ladder, it was necessary to use the trap net to collect brook trout massed off the mouth of Hatchery Creek.

A total of 429 brook trout were trapped and transported to the spawning facility. Male brook trout totaled 158 and females totaled 271. Temiscamie and naturalized brook trout were spawned randomly as in previous years.

Brook trout green eggs totaled 527,406 from 268 females for an average fecundity of 1,968 eggs per female. Eyed eggs totaled 253,300 for an eye up survival of 48%.

Male brook trout averaged 387 mm total length, n=113 (Figure 6), and female brook trout averaged 414 mm total length, n=71 (Figure 7).

Population Sampling

A total of 1,234 cutthroat and 217 hybrid trout were trap netted and jaw tagged (Figure 8) at four locations around Henrys Lake. Tagged fish were predominately over 350 mm in total length (Figures 9-10). A total of 11,309 cutthroat trout and 3,520 hybrid trout were given right ventral fin clips in the hatchery run. A total of 734 cutthroat trout and 798 hybrid trout were examined for marks/tags in the creel during 1994. The estimated total of Henrys Lake cutthroat vulnerable to harvest (≥350 mm) was calculated by using marked fish from the 1994 spawning run and assuming 50% mortality, and fish marked by jaw tagging. Capture groups were from the May 1994 trap netting effort, the opening weekend creel survey, and the season long creel survey. This provides for five estimates for cutthroat trout and five estimates for hybrid trout. An additional estimate was made using the harvest estimate from the 1994 creel survey and dividing this range of numbers at 95% confidence interval by the estimated exploitation rate from jaw tag returns (Tables 1-3).

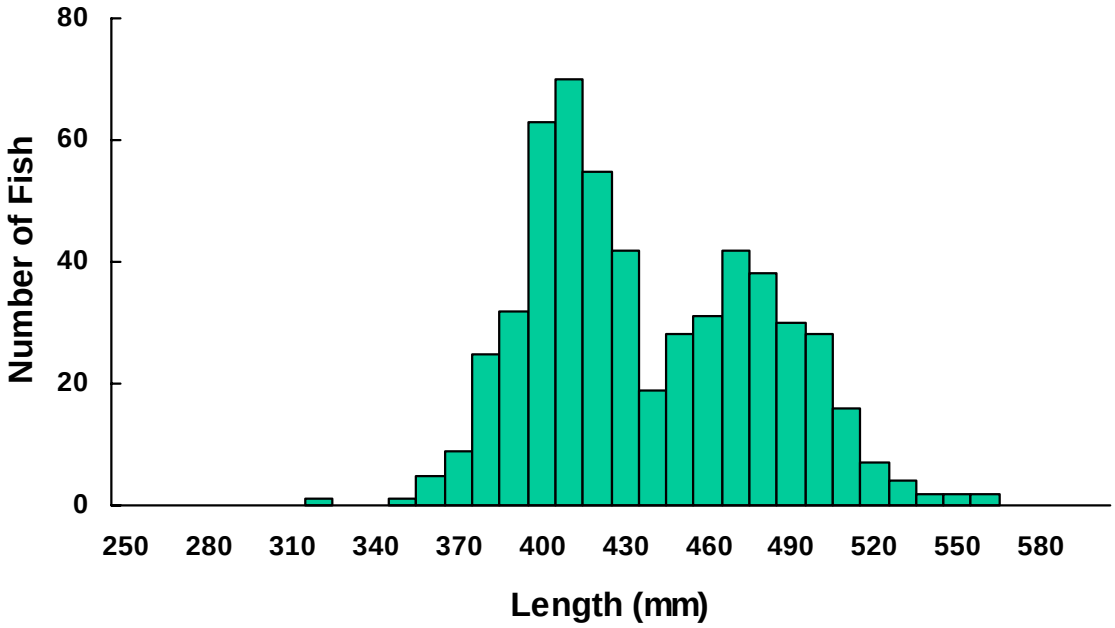

Figure 2. Length frequency of male cutthroat trout in the Henrys Lake Hatchery spawning run, 1994.

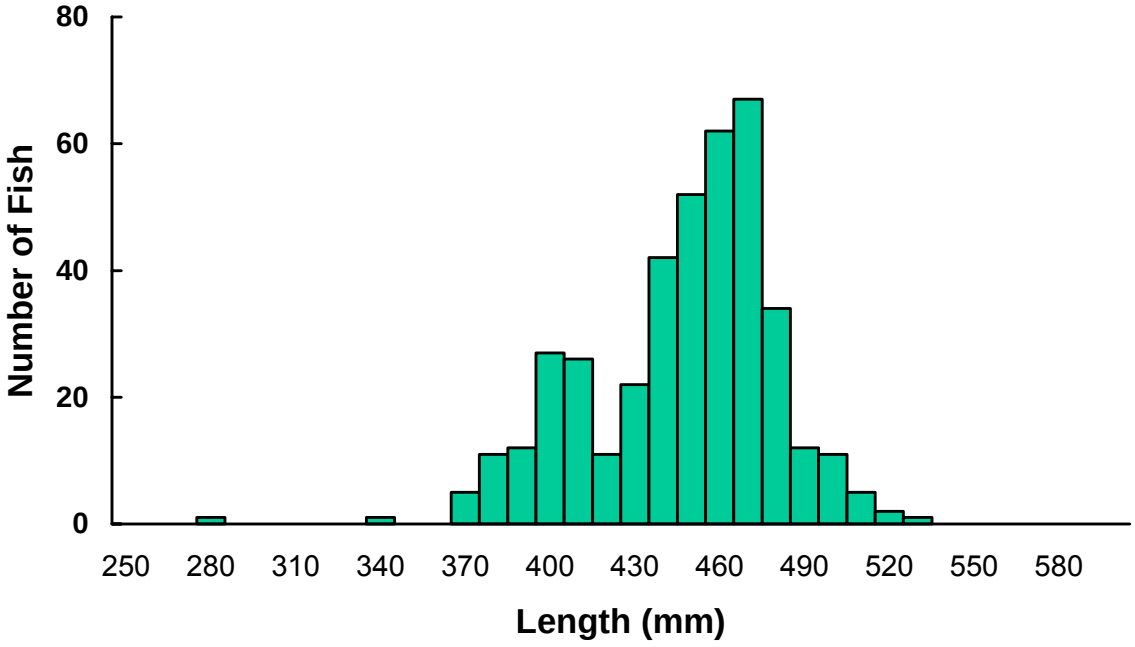

Figure 3. Length frequency of female cutthroat trout in the Henrys Lake Hatchery spawning run, 1994.

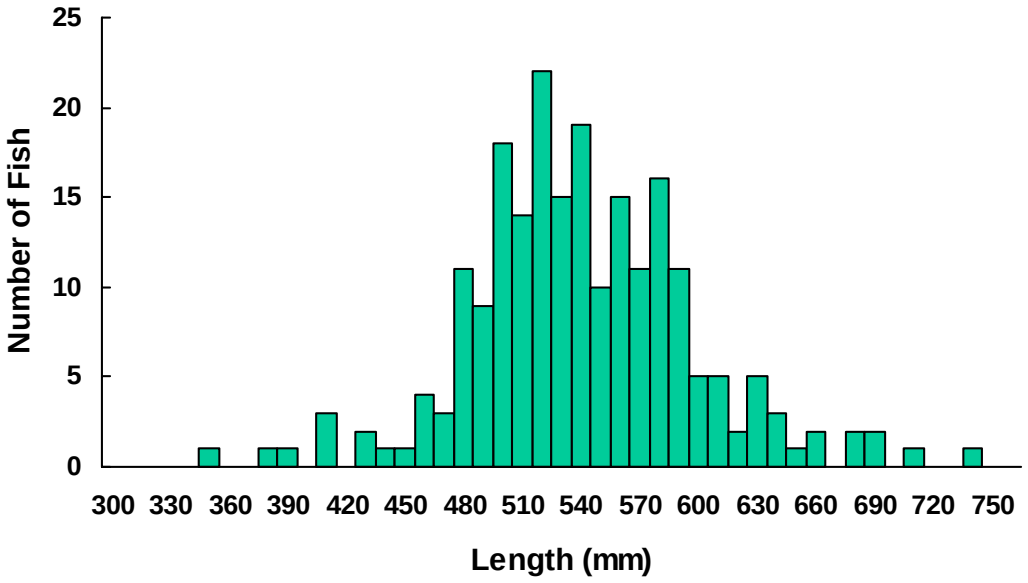

Figure 4. Length frequency of female cutthroat trout in the Henry's Lake Hatchery spawning run, 1994.

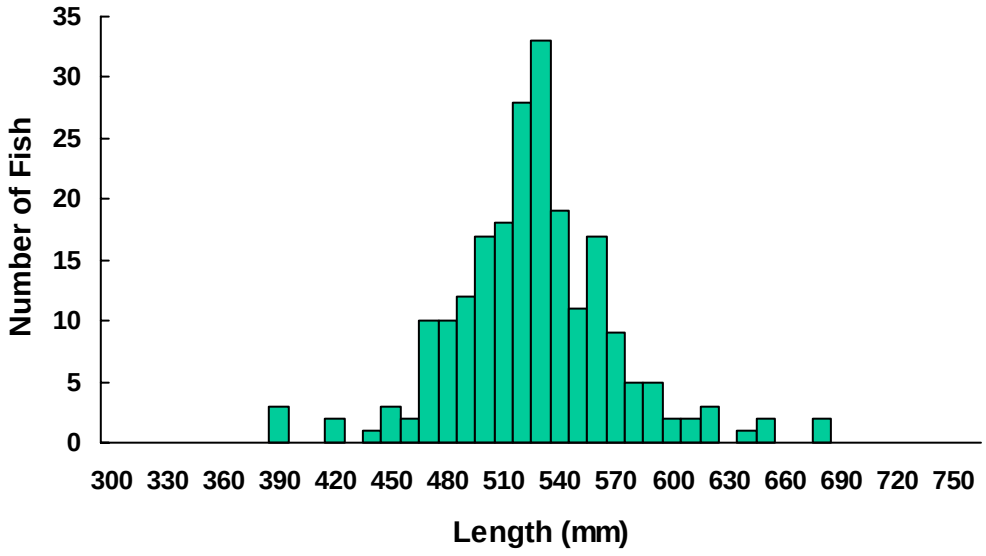

Figure 5. Length frequency of female hybrid trout in the Henrys Lake Hatchery spawning run, 1994.

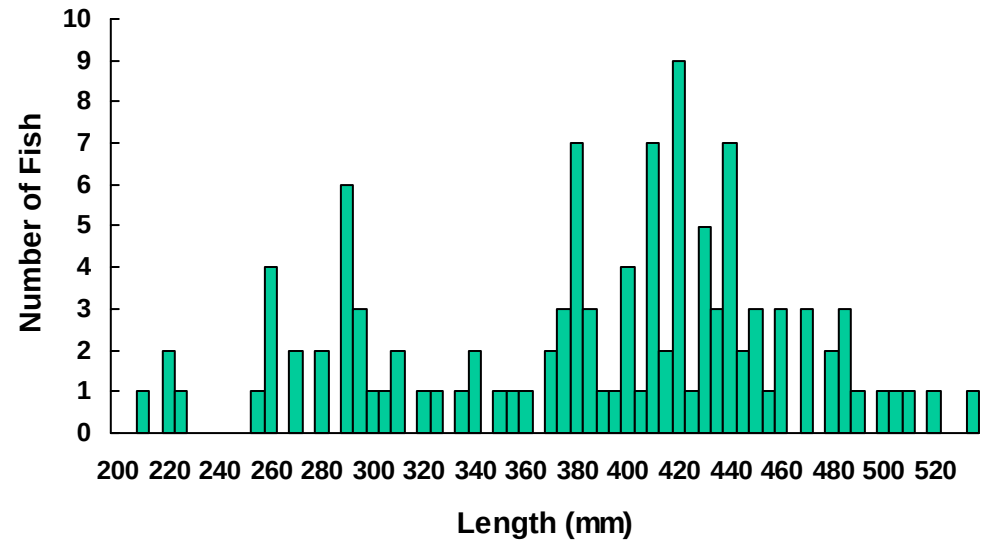

Figure 6. Length frequency of male brook trapnetted at the mouth of Hatchery Creek, October 1994.

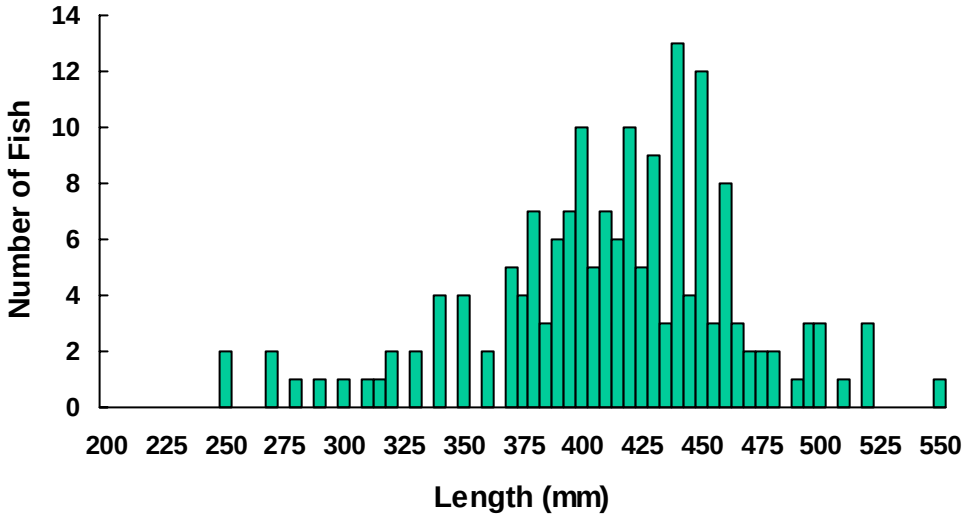

Figure 7. Length frequency of female brook trapnetted at the mouth of Hatchery Creek, October 1994.

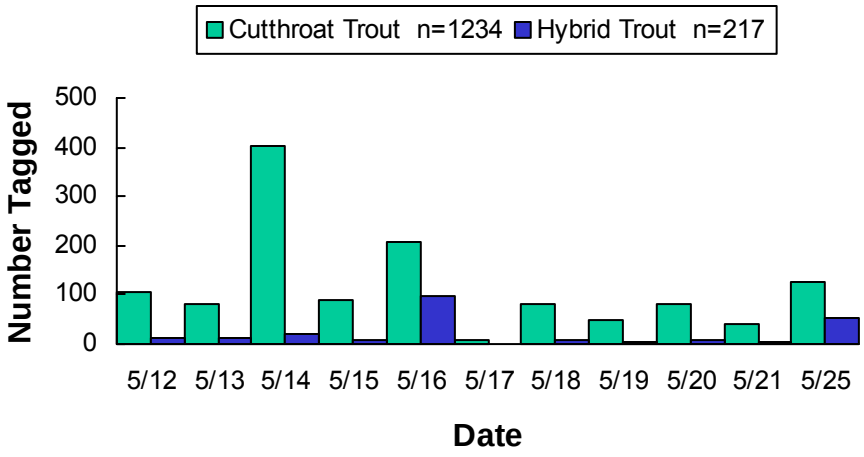

Figure 8. Trapnetting dates and number of cutthroat & hybrid trout jaw-tagged in Henrys Lake, 1994.

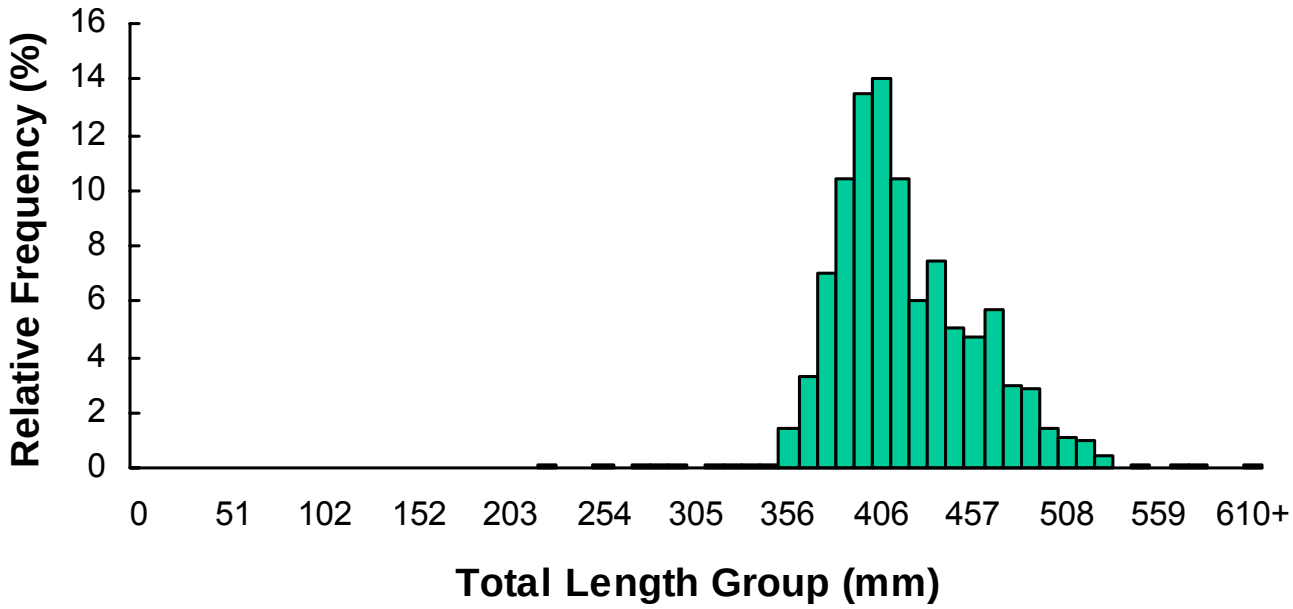

Figure 9. Length frequency of cutthroat trout trapnetted and jaw-tagged, Henrys Lake, May 12-25, 1994.

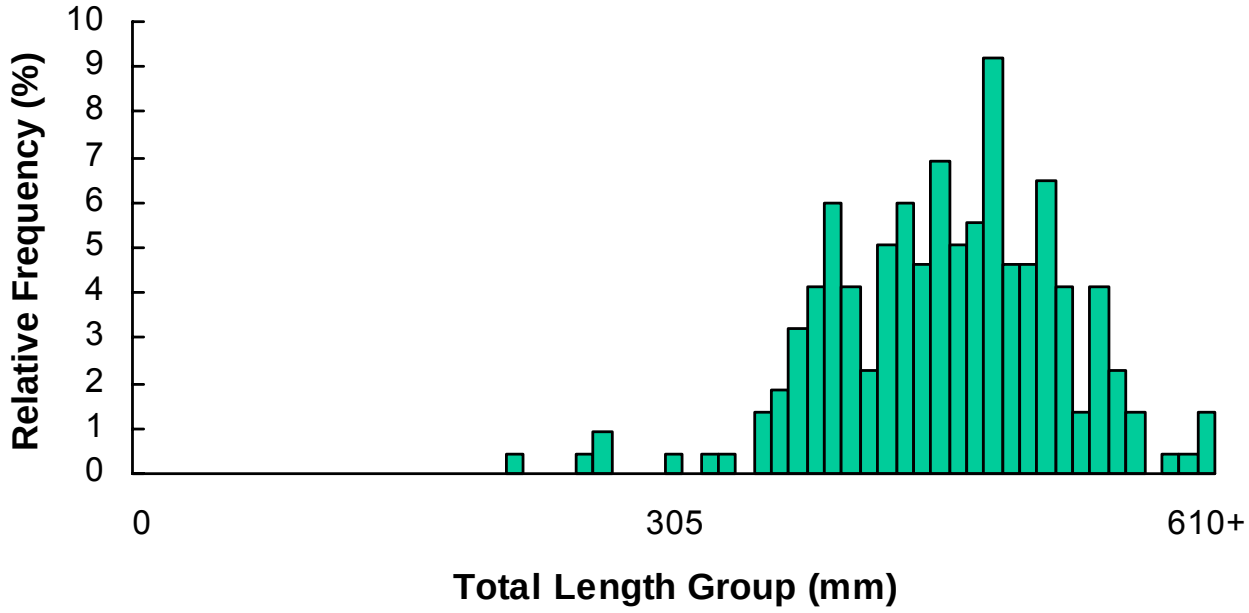

Figure 10. Length frequency of hybrid trout trapnetted and jaw-tagged, Henrys Lake, May 12-25, 1994.

Table 1. Mark-recapture data used to estimate abundance of cutthroat trout ≥350 mm in Henrys Lake prior to the fishing season, 1994.

Capture & marking method	Mark	Dates Marked	Number marked	Recapture method	C	R	Recapture rate % (R/M*100)	Proportion of marks in recap run (%)
Spawn Ladder	RV	3/1 - 5/25	11,309 (5,655)	Trapnetting	1,547	127	1.12 (2.24)	8.21
Spawn Ladder	RV	3/1 - 5/25	11,309 (5,655)	Opener creel & trapnetting	1,855	130	1.15 (2.30)	7.01
Spawn Ladder	RV	3/1 - 5/25	11,309 (5,655)	Season creel & trapnetting	2,303	136	1.20 (2.40)	5.91
Trapnetting	Jaw Tag LV	5/12-22	1,234	Opener Harvest	308	5	0.41	1.62
Trapnetting	Jaw Tag LV	5/12-22	756	Season Harvest	756	22	1.78	2.91

Table 2. Mark-recapture data used to estimate abundance of hybrid trout ≥350 mm in Henrys Lake prior to the fishing season, 1994.

Capture & marking method	Mark	Dates Marked	Number marked	Recapture Method	C	R	Recapture rate % (R/M*100)	Proportion of marks in recap run (%)
Spawn Ladder	RV	3/1 - 5/25	3,520 (1,760)	Trapnetting	336	63	1.79 (3.58)	18.75
Spawn Ladder	RV	3/1 - 5/25	3,520 (1,760)	Opener creel & trapnetting	817	72	2.05 (4.10)	8.81
Spawn Ladder	RV	3/1 - 5/25	3,520 (1,760)	Season creel & trapnetting	1,132	74	2.10 (4.20)	6.54
Trapnetting	Jaw Tag LV	5/12-22	217	Opener creel	481	3	1.38	0.62
Trapnetting	Jaw Tag LV	5/12-22	217	Season harvest	798	7	3.23	0.88

Table 3. Estimates of cutthroat and hybrid trout (≥350 mm, TL) abundance by six methods in Henry's Lake, 1994.

Method	Population estimate (±95% CI)			
	Cutthroat		Hybrids	
RV clip over trapnetting	68,402	(±11,305)	9,273	(±2,029)
RV clip over opening weekend	80,134	(±13,179)	19,733	(±4,291)
RV clip over entire season	95,120	(±15,391)	26,602	(±5,780)
Jaw tags over opening weekend	63,602	(±47,609)	26,269	(±22,930)
Jaw tags over entire season	40,648	(±16,014)	21,773	(±14,154)
Jaw tag returns with harvest estimate	583,402	(±233,151)	228,656	(±149,307)

Gillnetting

Gillnetting was conducted at six standardized sites on Henrys Lake with 1 net-night per location. Netted cutthroat trout totaled 14 fish ranging in length from 270 mm to 475 mm with an average length of 403 mm (Figure 11). Hybrid trout totaled 18 fish ranging 220-563 mm in length from with an average length of 387 mm (Figure 12). No brook trout were sampled by gill net; however two Utah chubs were found, and measured 188 mm and 220 mm. Cutthroat trout comprised 41% of the 34 fish netted; hybrid trout and Utah chubs accounted for 53% and 6%, respectively (Figure 13).

Purse Seining

Purse seine sampling was completed at 4 sites based primarily on aquatic macrophyte densities. A total of 232 fish were collected with 168 cutthroat (72.4%), 61 hybrids (26.3%), 2 brook trout (0.86%), and 1 Utah chub (0.43%) (Figure 14). Cutthroat trout average length was 267 mm with a range of 143 mm to 465 mm (Figure 15). Hybrid trout average length was 319 mm ranging 161 mm to 620 mm (Figure 16). Brook trout totaled 2 fish at 275 and 450 mm. There was 1 Utah chub collected at site ps 3 and measured 188 mm in total length.

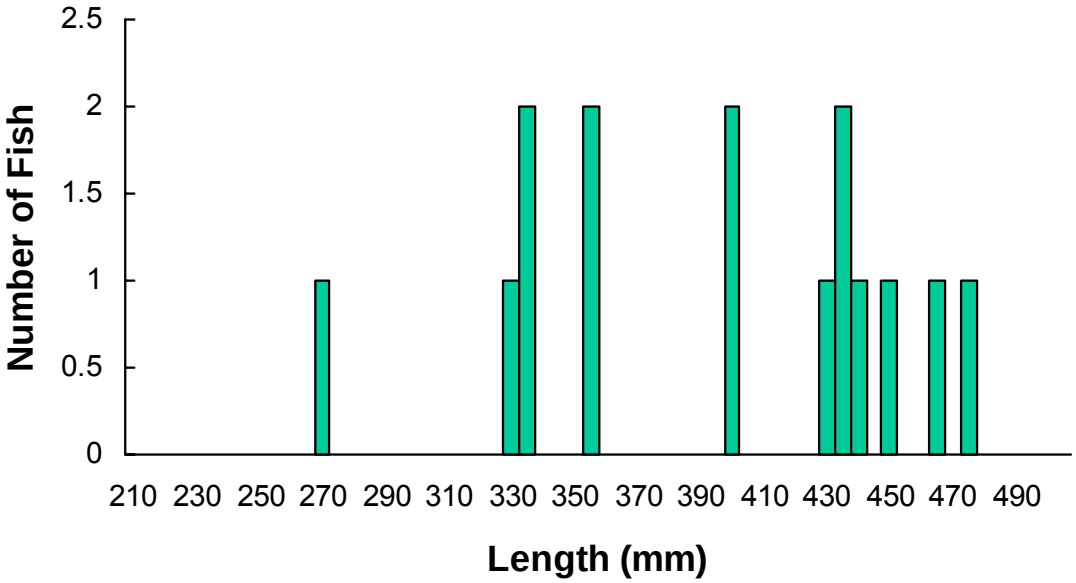

Figure 11. Length frequency of cutthroat trout captured with gill nets in Henrys Lake, August 1-11, 1994.

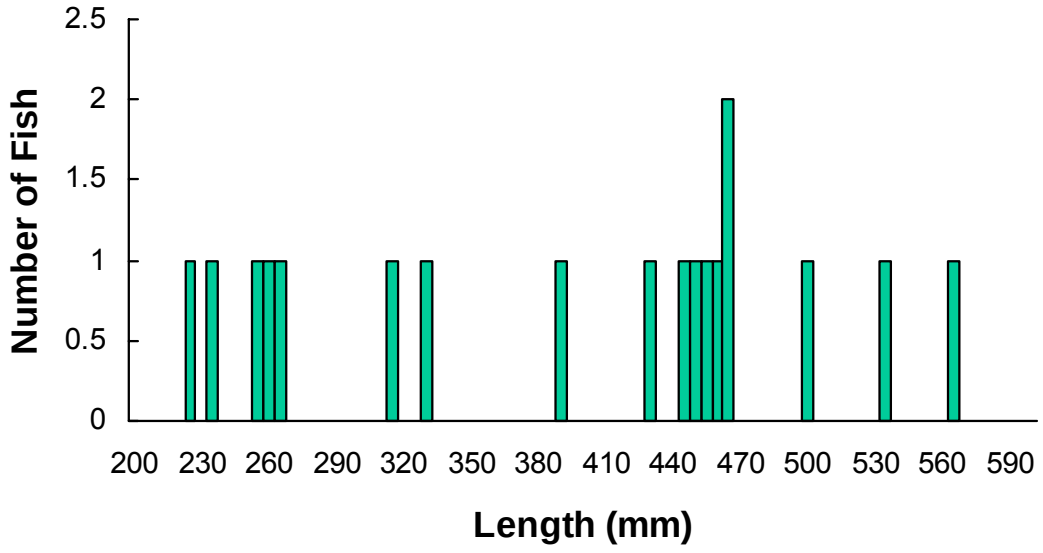

Figure 12. Length frequency of hybrid trout captured with gill nets in Henrys Lake, August 1-11, 1994.

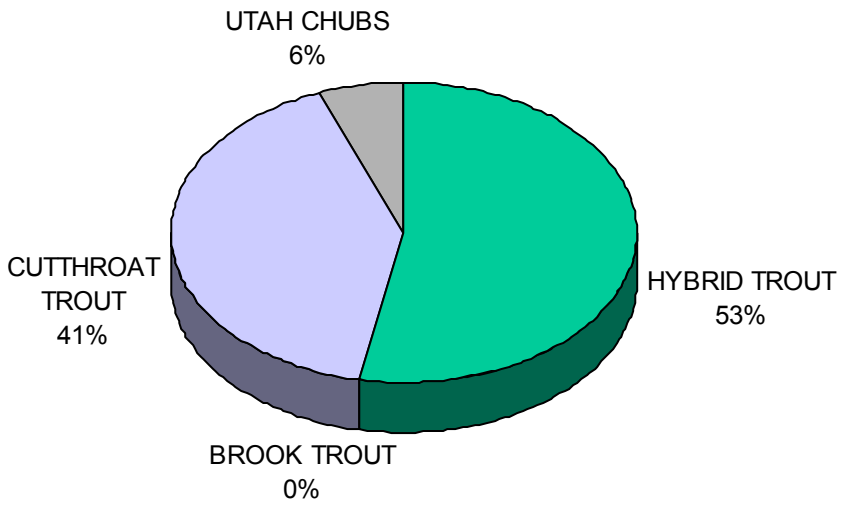

Figure 13. Catch composition in gill net samples in Henrys Lake, August 1-11, 1994.

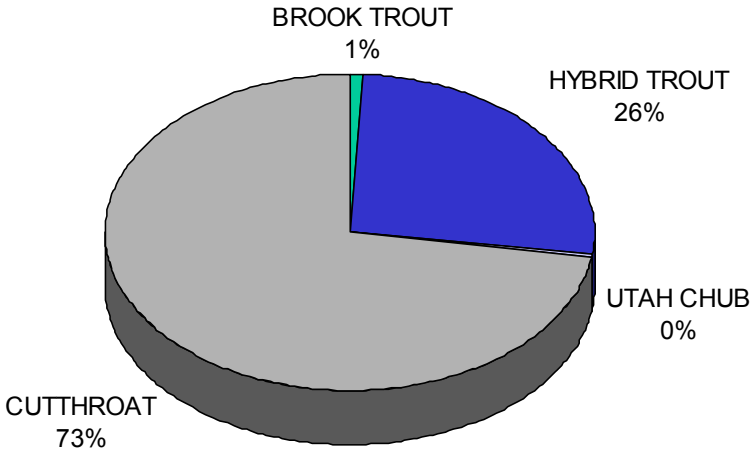

Figure 14. Catch composition in purse seine samples from Henrys Lake, July 7-8, 1994.

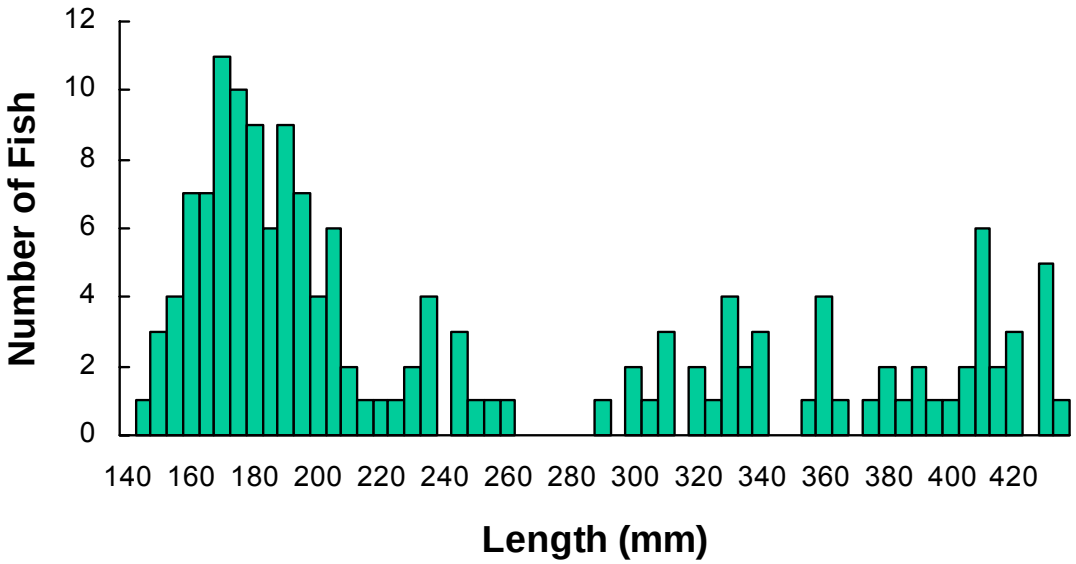

Figure 15. Length frequency of cutthroat trout collected with a purse seine in Henrys Lake, July 7-8, 1994.

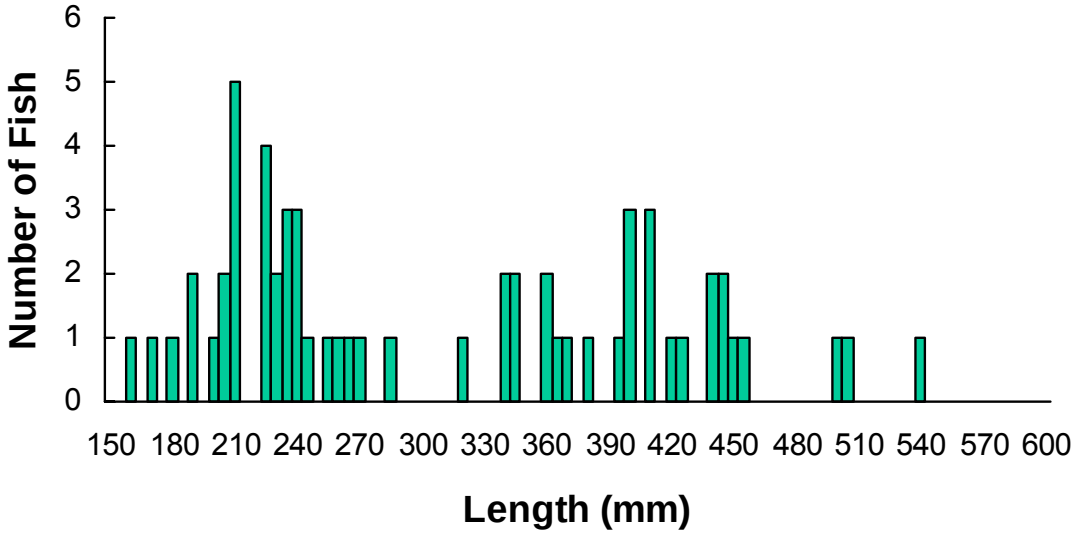

Figure 16. Length frequency of hybrid trout collected with a purse seine in Henrys Lake, July 7-8, 1994.

Creel Survey

The 1994 angler survey consisted of 47 survey days over the five month fishing season on Henrys Lake. There were 3,510 anglers interviewed in 1,557 interviews; of these anglers, 70.71% were residents and 31.45% were nonresidents (Figure 17). There were 948 completed trips with an average trip length of 3.19 hours. Instantaneous counts indicated 60.01% of anglers fished from boats, 15.49% fished from shore, and 24.5% of anglers fished with float tubes (Figure 18). Bait fishing accounted for 31.48% of fishing methods while lure fishing was 42.46% and fly fishing comprised 26.06% (Figure 19). Catch composition consisted of 52.06% cutthroat trout, 43.45% hybrid trout, and 4.49% brook trout (Figure 20).

Estimated angling effort totaled 177,826 hours and the interval estimate was 156,096 to 199,556 hours at the 95% confidence level. Estimated total catch was 116,796 fish and the interval estimate was 99,700 to 133,892 at the 95% confidence level. The overall season catch rate was 0.657 fish per hour. The estimated season harvest was 21,008 fish for a harvest catch rate of 0.12 fish per hour. The proportion of fish released was 82%.

Cutthroat trout average total length in the creel was 418 mm with a range of 240 mm to 712 mm (Figure 21). Average total length of hybrid trout was 437 mm with a range of 240 mm to 875 mm (Figure 22).

Of 734 cutthroat trout observed in the creel survey, 22 had adipose fin clips. This equates to 2.997% of observed fish with adipose clips. Each year 10% of stocked fish are given adipose fin clips. Multiplying 2.997% by 10 equals 29.97% as the proportion of hatchery fish in the population. Conversely 70.03% of the population would be of wild origin. This is an increase of 5% over the 1993 estimate of 65% wild fish in the population.

Limnological Sampling

Ice formed on Henry's Lake November 12, 1993. Little snow accumulated on lake ice until after Thanksgiving, allowing light transmission and subsequent super saturation of oxygen. Traditionally, the site 320 m east of the county boat dock experiences high depletion rates of low initial oxygen levels in the water column under ice. On January 10, oxygen totaled 37.5 g/m^2 of surface area at this site. Oxygen depleted at a rate of 0.354 g/d over the sampling period (Figure 23).

The lake helixing system installed during the summer of 1993 was started on October 1, 1993, and ran continuously through the winter for testing purposes. On January 7, 1994, sampling showed total oxygen adjacent to the most distant helixers to be at saturation totaling 33.5 g/m^2 of surface area. Poor ice conditions and the expense of an airboat prevented further sampling around the helixers until ice receded.

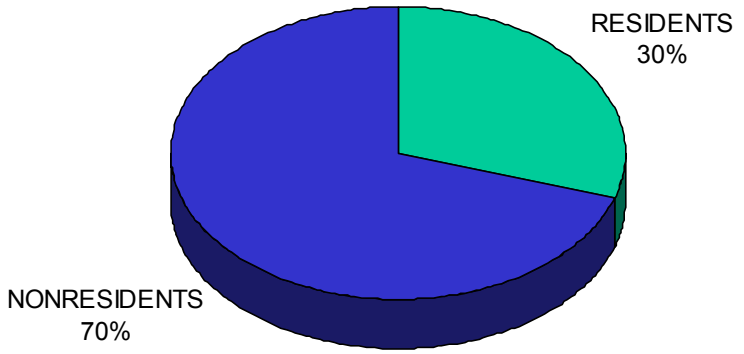

Figure 17. Proportions of resident and nonresident anglers on Henrys Lake, 1994.

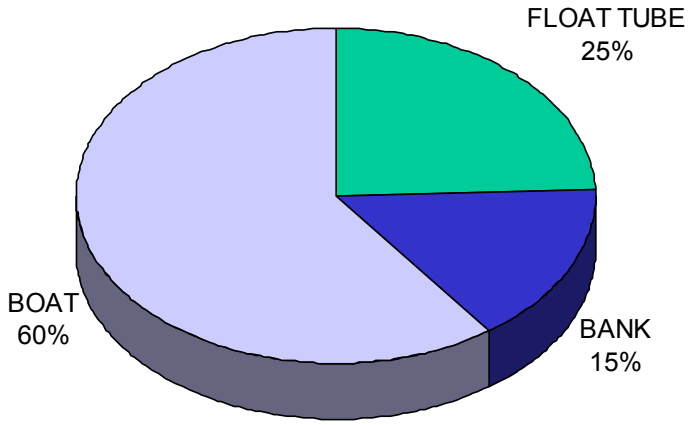

Figure 18. Composition of fishing types on Henrys Lake, 1994.

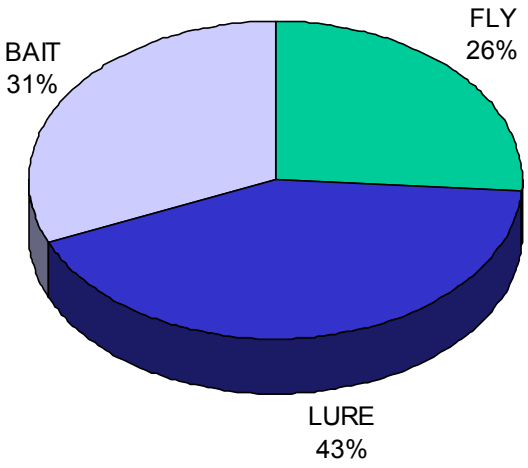

Figure 19. Breakdown of fishing methods used on Henrys Lake, 1994.

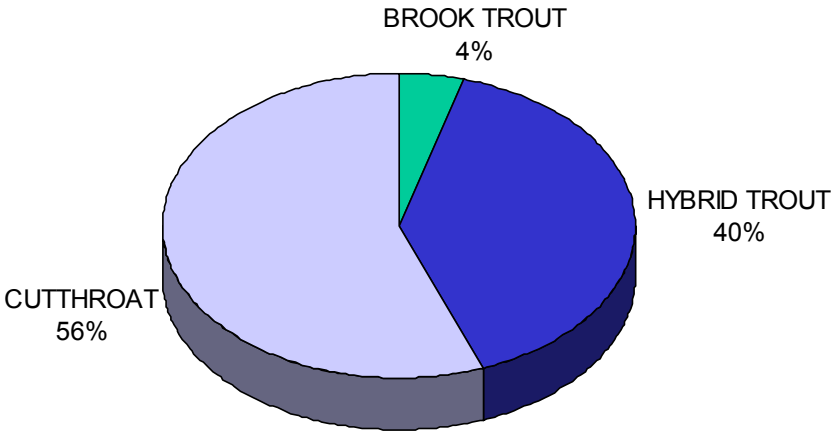

Figure 20. Harvest composition in the Henrys Lake fishery, 1994.

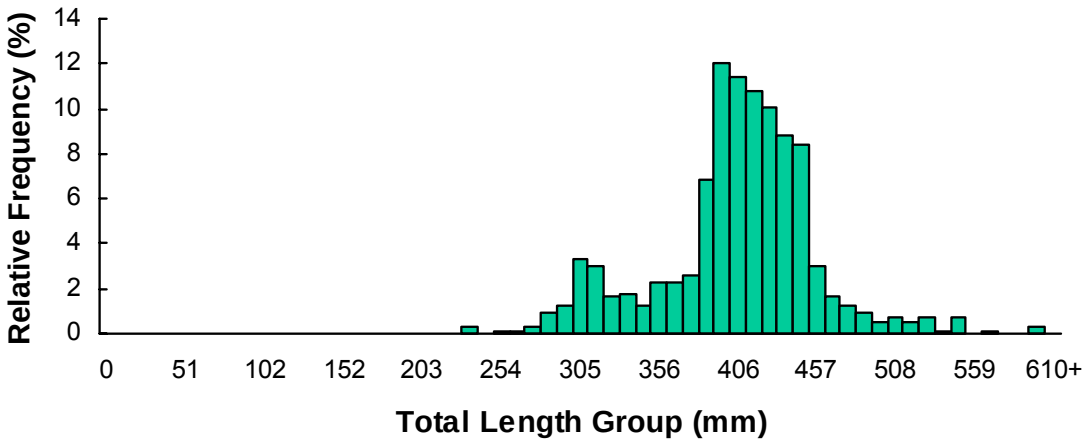

Figure 21. Length frequency of cutthroat trout observed in the creel in Henrys Lake, 1994.

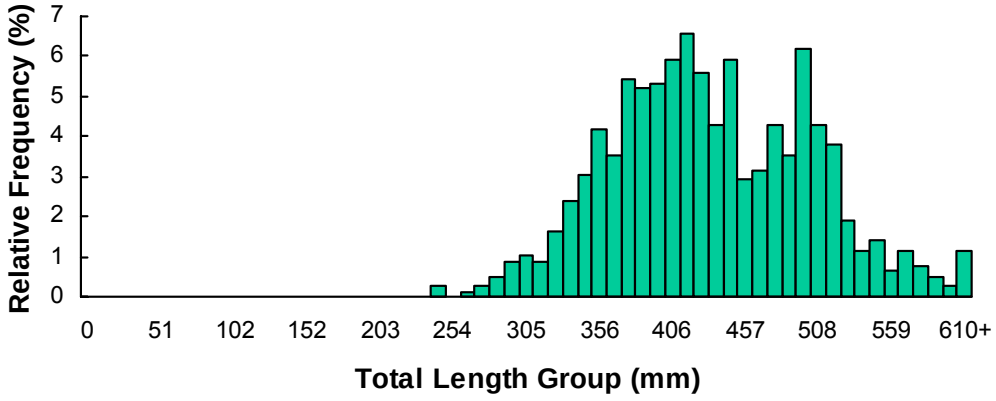

Figure 22. Length frequency of hybrid trout observed in the creel in Henrys Lake, 1994.

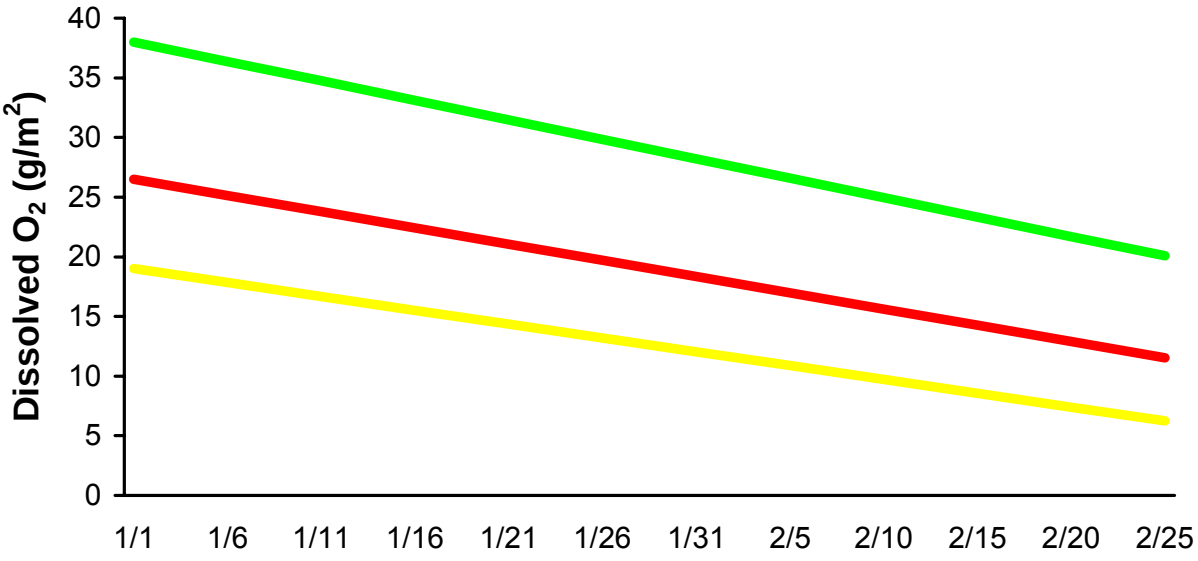

Figure 23. Dissolved oxygen depletion rates in Henrys Lake, 1992, 1993, and 1994. Sample site was located approximately 320 m east of the county boat ramp.

Results of water quality analyses are given for each site sampled (Appendix A). Warm water temperatures and abundant sunlight set the stage for prolific algal blooms during 1994. The Island Park area averages approximately 28 in of precipitation annually. 1994 annual precipitation totaled 23.54 in, and from May 1 to October 31, precipitation totaled 8.46 in. Water clarity steadily decreased throughout the summer as indicated by Secchi disk measurements. Secchi depths decreased from 6 meters on May 5 to 0.5 meters at some sites by September 26. The largest algal bloom, indicated by measured chlorophyll-a concentrations, occurred in September with concentrations ranging from 16.5 to 158 ug/L. Total ammonia as N was at its highest recorded level for 1994 on October 25 (last sample date for the season) at 0.324 µg/L.

APPENDIX

Appendix A. Henrys Lake 1994 sample result summary.

Site #1 - Glory Hole (300 yards northeast of the barn at Staley Spring).

Date	Site depth (m)	Depth (m) sample	Depth (m) Secchi disk	Chlorophyll a	T. ammonia as N	T. NO2 & NO3 as N	TKN as N	Total P as P	Phosphate
05 May 94	4.5	3.50	4.25	1.1	0.011	0.008	0.33	<0.050	0.025
05 May 94	Duplicate	3.50	4.25	0.6	0.012	0.008	0.38	<0.050	0.019
12 July 94	4.25	3.25	4.25	2.1	0.019	0.007	0.28	0.022	<0.005
02 Aug 94	4.00	3.00	4.00	1.1	0.030	0.006	0.22	0.023	<0.005
24 Aug 94	3.75	2.75	2.75	2.7	0.069	>0.005	0.60	0.060	0.028
24 Aug 94	Duplicate	2.75	2.75	1.8	0.073	0.007	0.74	0.080	0.031
13 Sep 94	3.50	2.50	2.50	3.3	0.057	0.009	0.52	0.040	0.008
26 Sep 94	3.50	2.00	2.00	16.5	0.073	0.022	0.85	0.048	0.010
26 Sep 94	Duplicate	2.00	2.00	8.5	0.049	0.020	0.87	0.045	0.012
25 Oct 94	3.50	2.25	1.50	6.3	0.324	0.106	0.86	0.039	0.006

Site #2 - Hatchery (One mile south of Pittsburgh Creek).

Date	Site depth (m)	Depth (m) sample	Depth (m) Secchi disk	Chlorophyll a	T. ammonia as N	T. NO2 & NO3 as N	TKN as N	Total P as P	Phosphate
05 May 94	6.00	5.00	6.00	2.5	0.012	0.007	0.28	<0.050	0.017
05 May 94	Duplicate	5.00	6.00	0.6	0.012	0.008	0.38	<0.050	0.019
12 July 94	Site not sampled because of wind			--	--	--	--	--	--
02 Aug 94	5.25	4.25	4.25	2.1	0.025	0.009	0.30	0.020	<0.005
02 Aug 94	Duplicate	4.25	4.25	2.2	0.027	0.009	0.30	0.015	<0.005
24 Aug 94	5.00	2.00	2.00	13.1	0.016	<0.005	0.52	0.041	0.012
24 Aug 94	5.00	4.00	2.00	--	0.018	<0.005	0.40	0.038	0.011
13 Sep 94	5.00	2.75	2.75	13.8	0.035	0.014	0.53	0.040	<0.005
13 Sep 94	5.00	4.00	2.75	--	0.025	0.013	0.57	0.040	<0.005
26 Sep 94	5.00	1.75	1.75	31.5	0.041	0.015	0.80	0.047	0.009
26 Sep 94	5.00	4.00	1.75	--	0.014	0.011	0.79	0.035	0.007
25 Oct 94	5.00	1.50	1.50	37.0	0.168	0.056	1.37	0.060	0.008
25 Oct 94	5.00	4.00	1.50	--	0.170	0.055	0.80	0.031	0.012

Appendix A. Continued.

Site #3 - Outlet (at old Caugher dam site).

Date	Site depth (m)	Depth (m) sample	Depth (m) Secchi disk	Chlorophyll a	T. ammonia as N	T. NO2 & NO3 as N	TKN as N	Total P as P	Phosphate
05 May 94	5.00	4.00	3.75	1.7	0.007	0.008	0.30	<0.050	0.021
12 July 94	4.75	4.00	3.75	1.6	0.011	0.007	0.25	0.017	<0.005
12 July 94	Duplicate	4.00	3.75	2.5	0.014	0.012	0.29	0.017	<0.005
02 Aug 94	5.25	4.00	4.00	<0.1	0.047	0.015	0.32	0.023	<0.005
24 Aug 94	4.75	2.25	2.25	4.4	0.021	0.007	0.37	0.022	0.011
24 Aug 94	4.75	3.75	2.25	--	0.023	0.007	0.39	0.026	0.008
13 Sep 94	4.50	3.50	4.00	2.0	0.056	0.015	0.41	0.023	<0.005
13 Sep 94	Duplicate	3.50	4.00	2.0	0.044	0.012	0.47	0.023	<0.005
26 Sep 94	4.75	0.50	0.50	158.0	0.014	<0.005	3.70	0.120	0.017
26 Sep 94	4.75	3.75	0.50	--	0.036	0.013	0.84	0.040	0.009
25 Oct 94	5.00	4.00	4.00	--	0.442	0.102	1.56	0.070	0.021
25 Oct 94	Duplicate	5.00	4.00	2.8	0.460	0.102	1.32	0.090	0.009

1994 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-19

Project I: Surveys and Inventories

Subproject I-G: Upper Snake Region

Job: b^2 - Island Park Reservoir, Palisades Reservoir, Ririe Reservoir, Mud Lake, Roberts Gravel Pond

Title: Lowland Lakes Investigations

Contract Period: July 1, 1994 to June 30, 1995

ABSTRACT

An on-the-water creel survey was conducted in the summer of 1994 on Island Park Reservoir. Fishing was generally poor (rating given by 56% of angling parties interviewed). While most anglers did poorly (45% harvested no fish), a small minority did quite well (9% harvested six fish). Angling pressure (41,000 hours) and catch rate (0.2 fish/h) were among the lowest recorded in the nine creel surveys conducted since 1960. A simultaneously conducted postcard creel survey produced results similar to those from the on-the-water survey but appeared to be biased toward more successful angling parties due to differential response rates.

Anecdotal observation revealed a significant spawning run of kokanee *Oncorhynchus nerka kennerlyi* out of Island Park Reservoir into Moose Creek. This was the first spawning run since the 1992 renovation, indicating that fingerling kokanee stocked in Moose Creek in fall 1992 returned as 16-22 in spawning adults only two years later (fall 1994).

A lowland lake survey at Island Park Reservoir revealed the lowest catch per unit effort (4.4 fish/gill net night) and proportion of gill net catch (11%) for suckers *Catostomus sp.* and Utah chub *Gila atraria* in two pre- and two post-renovation sampling efforts conducted since 1991.

Dissolved oxygen monitoring in Mud Lake during the winter of 1993-1994 indicated sufficient dissolved oxygen to overwinter fish, unlike in the winter of 1992-1993 when a major fish kill occurred.

Mid-water trawling resulted in the capture of no kokanee in two nights of sampling at Palisades Reservoir, and 41 kokanee were captured in one night of effort at Ririe Reservoir. The Ririe Reservoir kokanee had length modes at 45, 130, 240, and 340 mm total length, and a total kokanee biomass of 4.3 kg/ha was calculated based on the trawling results.

A lowland lake survey at Roberts Gravel Pond revealed a fishable number of rainbow trout *O. mykiss*, and large numbers of generally small panfish of the following species: yellow perch *Perca flavescens*, bluegill *Lepomis macrochirus*, pumpkinseed *Lepomis gibbosus*, and bullhead *Ameiurus sp.*

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METHODS

Island Park Reservoir

Creel Survey (On-the-water)

An on-the-water creel survey (intermediate intensity) was conducted on Island Park Reservoir from May 28 to August 20, 1994. Creel clerks used various motor boats to conduct instantaneous angler counts and to interview shore, boat, and float tube anglers. Habitat Management personnel conducted some interviews during the opening weekend. The reservoir was split into two sections, the East section (#1) and the West section (#2) divided at the obvious narrows west of Bill's Island. There were seven survey intervals, each one two weeks in length; however only weekend days were sampled in the first and last intervals.

Creel Survey (Postcard)

A low-intensity postcard creel survey was conducted at Island Park Reservoir during the summer of 1994. The objective was to test the efficacy of the postcard survey technique by comparing the results with those of the exponentially more labor intensive but concurrent on-the-water creel survey. On designated sampling days postcards were placed on the windshields of all vehicles parked at Island Park Reservoir access points. Results were tabulated using the Idaho Department of Fish and Game (IDFG) creel surveys as possible.

Kokanee Spawning Run

Anecdotal information was collected during electrofishing efforts regarding the fall 1994 kokanee *Oncorhynchus nerka kennerlyi* spawning run up the Henrys Fork from a local cabin owner and up Moose Creek by Ashton Hatchery personnel doing random spawner counts.

Lowland Lake Survey

A lowland lake survey was conducted on Island Park Reservoir June 14-16. Sampling consisted of gillnetting (8 net-nights) and trapnetting (4 net-days). Sacrificed game fish were eviscerated, iced down, and given to the Gleaners organization in Idaho Falls.

Boat electrofishing was conducted August 3-4 (2 hrs 25 min). Shocking was stopped prematurely on August 4 due to mechanical breakdown of the jet boat (all batteries were drained dead).

Mackay Reservoir

Dam Spillway Salvage

On October 18, Region 6 IDFG personnel met at the Mackay Dam spillway to salvage fish from the irrigation ditch that comes off of the Big Lost River just below the dam. This was concurrent with the Big Lost River Irrigation District's announced reduction in flow through the dam for control gate maintenance.

Mud Lake

Dissolved Oxygen Monitoring

Dissolved oxygen (DO) concentrations in the water column were monitored January through March 1994 with the assistance of the Eagle Rock Bassmasters. An Oxygard DO/Temp meter was used to measure DO water temperature at ten sites in the eastern basin of the lake. Observations were also made regarding the water depth and the amount and condition of aquatic vegetation at each site.

Palisades Reservoir

Dam Spillway Salvage

On October 20, regional IDFG and Bureau of Reclamation personnel salvaged fish stranded in the stilling basin in the Palisades Dam spillway concurrent with and as a result of dewatering for routine cleaning and maintenance by the Bureau of Reclamation. Fish were shocked with two backpack shockers after each of the three individual chambers was segregated into two halves using a large seine or block net set across the mid-chamber baffles. Fish were then transported in garbage cans by canoe to the nearest outside wall where they were loaded into metal drums suspended from a mobile crane. The metal drums of fish were then raised up to the service deck level, loaded onto a pickup truck, driven to the boat ramp immediately below the dam, and released.

Anecdotal Cutthroat Trout Information

Anecdotal information on cutthroat trout *O. clarki* was gathered from local anglers and residents in the course of normal business.

Kokanee Run, Big Elk Creek

During August and September, a relatively large number of kokanee ran up Big Elk Creek to spawn. This was an anomalous situation for three reasons: the magnitude of the run, the relatively large fish size (up to 23"), and most importantly that the reservoir was drawn down to such a low level that basically the only water in the Big Elk Creek arm (above Highway 26) was the creek channel. A number of Conservation Officers worked the resultant fishery and wrote multiple citations, mainly for overharvest and illegal method of take.

Kokanee Trawling

Kokanee trawling was conducted with Fisheries Bureau staff and the Boise-based trawl boat on July 6-7. Seven multi-step trawl tows were made.

Ririe Reservoir

Bass Tournaments

The Eagle Rock Bassmasters Budweiser Bass Tournament is the largest fishing tournament held annually on Ririe Reservoir. The two-day tournament is typically held in the middle weekend of July. Conservation Officers recorded total lengths of all bass *Micropterus spp.* weighed in at the tournament on the first day (July 16). Catch-per-unit-effort was monitored as usual for both legal and sublegal fish using Upper Snake Region bass cards.

Drawdown/Fish Loss Evaluation

In response to consistent complaints from both organized and non-organized bass anglers that smallmouth bass *M. dolomieu* numbers appeared to have dropped between 1992 and 1993 then stayed low in 1994. This initiated an investigation into what factors may have had a negative effect on the smallmouth bass population during the period.

Early Season Opener

Historically, Ririe Reservoir has had the same fishing season as the general stream season (Saturday of Memorial Day weekend to November 30). The reason for the lack of winter or spring fishing opportunity has been protection of wintering big game herds in the Willow Creek canyon. In 1994, we changed the opener to May 1 in order to provide more fishing opportunity while hopefully causing no negative effects to big game. An angler effort survey was conducted during opening weekend.

Kokanee Trawling

Kokanee trawling was conducted with Clark Shackelford and his Boise-based trawl boat on July 8-9. Six multi-step trawl tows were made.

Spillway Fish Kill

On September 3 a reported fish kill in the spillway below Ririe Reservoir was investigated. An Idaho Division of Environmental Quality crew had seen numerous dead fish while monitoring outflow water quality.

Roberts Gravel Pond

Lowland Lake Survey

A lowland lake survey was conducted on Roberts Gravel Pond in spring 1994.

Dan Duggan and Lew Huddleston conducted gillnetting (1 net-night) and trapnetting (4 net-days) on May 3-5, 1995. An attempt to electrofish the pond in early summer was impeded by equipment failure.

RESULTS AND DISCUSSION

Island Park Reservoir

Creel Survey (On-the-water)

Our word-of-mouth observation was that fishing on Island Park Reservoir in late 1993 and early 1994 was poor for most anglers although a few did quite well. This was born out in our summer 1994 creel survey which showed that almost 9% of anglers interviewed harvested a limit of trout but 45% harvested no fish. Total fishing pressure and catch rates were among the lowest on record since 1960 (Table 1). This is disappointing considering the reservoir's trout fishery should be nearing a post-renovation peak following the September 1992 renovation project.

Catch rates were nearly identical between the East (0.21 fish/hr) and West (0.20 fish/hr), however the heavier effort in the West section (66% of total) led to a greater proportion of the harvest there.

Table 1. Summaries of catch rates and total summer fishing effort estimates for Island Park Reservoir.

Year	Catch rate (trout/hr)	Hours fished	Census period
1960	0.82	75,668	June 4 - Oct 31
1965	0.43	107,789	May 19 - Oct 31
1967	0.54	92,949	June – October
1968	0.59	176,008	June – October
1981	0.44	70,820	May 23 – Oct 31
1982	0.23	124,442	May 28 – Sept 30
1989	0.30	49,085	May 27 – Sept
1990	0.14	N/A	May 26 – July 16
1994	0.20	41,308	May 28 – August 20

When asked how they rated their fishing at Island Park Reservoir on the day of the interview, anglers responded: Excellent (5%), Good (14%), Fair (25%) and Poor (56%).

Island Park Reservoir was opened for year-round fishing in 1994. This was an effort to not only provide more fishing opportunity to anglers but also to take advantage of what was expected to be a booming post-renovation trout fishery. So far it appears that only the former objective may have been accomplished.

Creel Survey (Postcard)

Results of the Island Park Reservoir postcard creel survey were not consistent with those of the on-the-water creel survey. Response rate was disappointingly low at 21%, indicating that results could be expected to be somewhat biased. Not surprisingly, the bias appears to be toward more successful anglers. Postcard survey respondents, when asked how they rated their fishing at Island Park Reservoir on the day of the interview, responded: Excellent (13%), Good (27%), Fair (20%) and Poor (40%). Ratings of excellent and good were nearly twice as common on the postcard creel survey compared to the on-the-water creel survey, and fair and poor ratings were slightly and significantly less common respectively. Also, the summer-long catch rate was 0.32 fish/hr, 60% higher than reported in the on-the-water creel survey.

Kokanee Spawning Run

Ashton Hatchery personnel's few spawner counts indicated a possible run peak on or about August 19. An observation by a Moose Creek cabin owner was that about 6 fish/day ascended the creek during the run. Combining these anecdotal observations with IDFG personnel observations of adult kokanee while electrofishing the Upper Henrys Fork in late August and early September indicates that as many as 500 adult kokanee ascended Moose Creek.

Additionally, an Idaho State University geology graduate student saw adult kokanee in Moose Creek in the North Fork burn area. We could not verify any adult kokanee at Big Springs or the Henrys Lake outlet bridge.

Lowland Lake Survey

The lowland lake survey revealed a mixed bag of results. On the positive side, Utah suckers *Catostomus ardens* and chubs *Gila atraria* were much less prevalent in the catch (and had significantly lower catch-per-unit-effort than in either pre- or immediately post-renovation sampling efforts (Table 2, Figure 1). The proportion of game fish (trout and kokanee) was probably weighed by recruitment of recently stocked catchable size rainbow trout *O. mykiss* to the gill nets. These hatchery fish are represented by the large mode of fish between 200 and 275 mm. Larger size classes of rainbow trout have a fairly even distribution but are low in numbers with an obvious void from 330 to 390 mm.

Nongame fish were captured in very low numbers, but their length frequency distributions are very similar to those prior to renovation.

Mackay Reservoir

Dam Spillway Salvage

The Big Lost River Irrigation District built a cofferdam in front of their dam control structure to allow them to clean out rocks, logs, and other debris from in front of the Penstock gates. A muddy flow of about 10 cfs leaked through and likely sustained any fish in the Big Lost River and the irrigation ditch immediately below. Consequently, we did no salvaging and would recommend no future salvaging in this situation since the dam will likely never leak less than 10 cfs while being serviced, unless it is rebuilt. It is worth notifying Idaho Division of Environmental Quality the next time the dam is serviced so they can monitor the operation (in addition to the muddy outflow due to equipment working in the water directly above the dam, a slight diesel spill was also noted from where vandals had siphoned the fuel out of the bulldozer the night before while it was parked basically in the lake right at the dam control structure).

Mud Lake

Dissolved Oxygen Monitoring

Dissolved oxygen concentrations (DO) in the water column were extremely low in 1993 due to a long period of thick snow cover coupled with low water before and during winter (Table 3). Of course, the lake was already dead or dying at the time these readings were taken. DO conditions were considerably better in 1994 probably due to a comparatively insignificant amount of snow cover (Tables 4-5).

Table 2. Trends in experimental gill net catches pre- and post-renovation at Island Park Reservoir, 1991-1994.

	Gill net catch composition		Gill net CPUE (fish /net night)	
Year	% Utah sucker and chub	% Game fish	Sucker and chub	Rainbow trout
1991	92%	8%	--	--
1992[a]	90%	2%	68	--
1993[a]	53%	47%	9	--
1994	11%	89%	4.4	26.3

[a] Renovation occurred between the 1992 and 1993 sampling efforts.

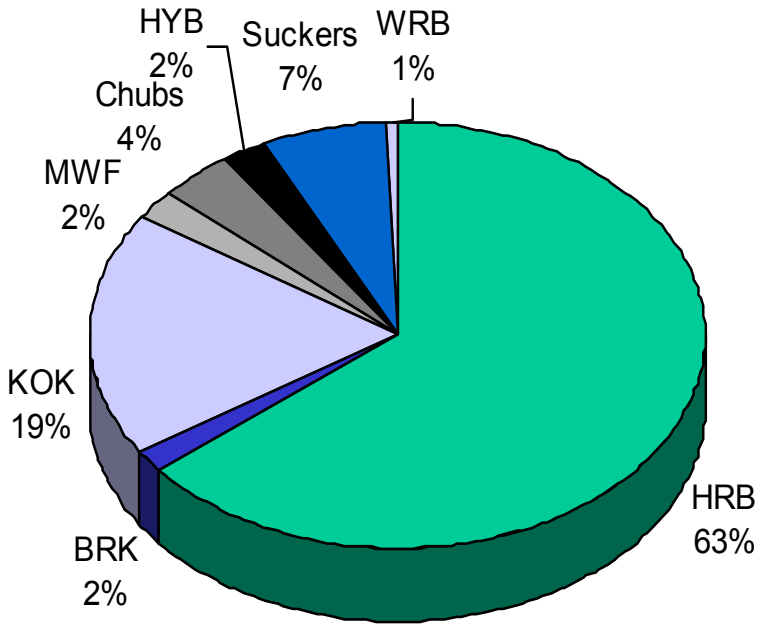

Figure 1. Catch composition of gill nets set in Island Park Reservoir, 1994.

Table 3. Mud Lake DO concentrations and other observations, January 30, 1993.

	Dissolved oxygen (ppm)				
Hole #	Top	Mid	Bottom	% saturation	Total depth[a] (in)
1	0.8	--	0.2	--	53
2	1.0	--	0.2	--	62
3	0.7	--	0.2	--	56
4	0.3	--	0.1	--	43
5	0.3	--	0.1	--	55
6	0.4	--	0.2	2%	48
7	0.3	--	0.2	--	58
8	0.8	--	0.3	5%	34
9	0.4	--	0.2	--	24
Average	0.6	--	0.2	3.5%	48

[a] Total depth is water and ice depths combined. Approximate two-foot snow depth and 18 in ice depth.

Table 4. Mud Lake dissolved oxygen concentrations and other observations, January 18, 1994.

	Dissolved oxygen (ppm)						Total depth
Hole #	Top	Mid	Bottom	Saturation	Snow	Ice depth	(in)
1	5.4	3.6	1.7	29%	3”	13.5”	47
2	10.0	8.6	5.8	66%	3”	13.5”	40
3	9.4	4.6	1.1	35%	3”	13.5”	62
4	9.6	2.2	0.5	19%	3”	13.5”	55
5	10.9	3.8	0.5	27%	3”	13.5”	54
6	8.2	6.7	0.7	51%	3”	13”	60
7	8.8	5.0	4.6	37%	2”	12”	44
8	5.4	1.0	0.5	10%	2”	13”	48
9	0.3	0.3	0.3	2%	3.5”	11”	35
Average	7.6	4.0	1.7	31%	2.8”	13”	51
Average w/o #9	8.5	4.4	1.9	34%	2.8”	13”	49

The amount, condition and type of moss were noted in each hole.
Tests taken 1/18/94.
Total depth included total of ice and water depth combined.
% saturation levels were taken at mid-water depth.

Hole #	Information
1	Some moss present, green in color, small type.
2	Very little moss present, small type, green.
3	Large amount of moss, small type, green.
4	Large amount, mostly dead with a little green, small type.
5	Large amount, mostly dead with a little green, small type.
6	Large amount, brown dormant looking, broad leaf type.
7	Large amount, brown dormant looking, broad leaf type.
8	Large amount, pretty green, long narrow broad leaf type.
9	Some moss lying flat, looked totally dead.

Table 5. Mud Lake dissolved oxygen concentrations and other observations, March 6, 1994.

	Dissolved Oxygen (ppm)						
Hole #	Top	Mid	Bottom	Saturation	Snow	Ice depth	Total depth
1	4.0	4.8	4.6	38%		18.5”	47”
2	5.5	6.4	6.5	51%		16.5”	57.5”
3	10.3	11.3	11.1	84%		17”	58.5”
4	2.5	1.8	1.2	15%		17.5”	54”
5	2.4	4.6	4.6	36%		19.5”	51”
6	1.9	1.6	1.6	14%		18”	61”
7	Not tested--moss opening up water--too dangerous						
8	4.1	6.1	6.1	47%		18”	42”
9	Not tested--moss opening up water--too dangerous						
Average	4.4	5.2	5.1	40.7%	0	17.9”	53”

The condition of moss was noted in each hole.
Tests taken 3/6/94.
Total depth included total of ice and water depth combined.
% saturation levels were taken at mid water depth.
Snow level varied--drifts were 6-12" deep--approximately 15% of the ice was covered with drifts; the rest no snow covering at all.

Hole #	Information
1	Some moss present, pretty green.
2	Some moss present, pretty green.
3	Large amount of moss, very green, new growth.
4	Large amount, all brown.
5	Large amount, new growth mixed with old brown moss.
6	Large amount almost to surface, mixed new and old.
7	Not tested.
8	Large amount, old growth greening up
9	Not tested.

Although a large amount of ice remains on the lake, as you go southwest from the north point patches of moss were being seen with open water around them. While driving across, patches of ice were breaking around these spots. The same was noted in the upper end near the game house. Also, approximately 7,500 snow geese were out on the ice with more coming in all the time.

Palisades Reservoir

Dam Spillway Salvage

We salvaged approximately 3,500 game fish from the stilling basin and stocked them below into the South Fork Snake River. Species salvaged and approximate size ranges in order of decreasing abundance were: cutthroat trout (8-26"), rainbow trout (8-30"), brown trout *Salmo trutta* (12-28"), and lake trout *Salvelinus namaycush* (8-24"). The most noteworthy observation other than the massive size of some of the cutthroat, brown, and rainbow trout, was the presence of many sizes of lake trout including those less than 12" in length, which are likely the product of natural reproduction.

Anecdotal Cutthroat Trout Information

Local anglers and residents reported very good cutthroat fishing in 1994 (even for the summer period which is comparatively rare) and aberrantly large runs of adults up reservoir tributary streams. These reports indicate a possible positive change in the cutthroat population and fishery. It is possible that the positive change is due to a recent switch by the Jackson NFH from a long-time domesticated cutthroat trout broodstock to a first generation out of the wild stock (B-BAR-C) from a Snake River tributary in Wyoming.

Kokanee Run, Big Elk Creek

The problem at Big Elk Creek appears to have been mostly social. With large spawning kokanee basically exposed in their upstream migration by the extremely low reservoir water levels, they were easy targets for both legal and illegal harvest. Some citizens complained that the hapless fish were being harassed and taken by unfair methods and in unfair numbers with no concern shown by the Idaho Department of Fish and Game. In reality, the Ashton and Idaho Falls District Conservation Officers conducted a fairly intense undercover operation that, although it resulted in many citations being written, was largely ineffective in correcting the problem due to recruitment of new "uneducated" fishermen on a daily basis.

Kokanee Trawling

The trawling effort netted no kokanee but captured a handful of mostly juvenile cutthroat and brown trout. The most notable finding was the capture of a number of Mysis shrimp *Mysis relicta* in the trawl. There was no previous record of Mysis in the reservoir since their last attempted introduction approximately 20 years prior. The catch rate of mysis in Palisades Reservoir trawling was low relative to that of Lake Pend Oreille but still very significant.

Ririe Reservoir

Bass Tournaments

Length frequency of bass captured in The Eagle Rock Bassmasters Budweiser Bass Tournament on July 16 was similar to that of 1993 (Figure 2). Likewise, tournament catch-per-unit-effort was similar for legal and all bass between 1993 and 1994 as was the magnitude of fishing effort (Figures 3 & 4). These observations seem lackluster but are more interesting when considered in light of the following evaluation.

Drawdown/Fish Loss Evaluation

We first considered weather and water conditions to solve the riddle of "where did the smallmouth go" in 1993. It was an anomalously cold and wet year with relatively high summer water levels following many consecutive hot, dry summers with low reservoir water levels. We suspected that the radically different fishing conditions were the cause of a perceived decrease in the quality (catch-per-unit-effort) of fishing for legal size smallmouth bass. This proved incorrect. In 1994, conditions returned to "normal" (hot and dry with low water) and the fishing was still poor.

Because harvest of smallmouth bass was low, according to the 1993 creel survey, overharvest seemed an unlikely factor. Tournament effort had increased, not only steadily since 1989, but 1993 and 1994 respectively had increasingly sharp increases in effort (Figure 5). Had effort increased to the point that catch-per-unit-effort started to drop dramatically, and/or had this new population finally peaked and started to decline?

Analysis of the catch-per-unit-effort for all sizes of smallmouth bass shows a possible very slight declining trend over time but with no pronounced inflection points from 1992 to 1993 or 1993 to 1994 (Figure 6). But what about for legal bass? Figure 6 shows the first real evidence of a problem, a dramatic decrease (over 50%) in catch-per-unit-effort of legal-size smallmouth bass from 1992 to 1993, then basically no change in 1994 when the fishing was poor again. Clearly, it appears that something happened to about half of the legal sized bass in Ririe Reservoir between the 1992 and 1993 tournament seasons.

There was no evidence of an in-reservoir fish kill, so did the fish leave the reservoir some other way? Analysis of the graph of Ririe Reservoir's water volume since 1989 indicates that the severe drawdown of the already low pool in fall 1992 may have resulted in as many as half of the legal bass in the reservoir being released downstream into Willow Creek and then possibly the Snake River above Idaho Falls. In fact, the even more severe fall drawdown of 1994 possibly further impacted the population of large smallmouth bass in Ririe Reservoir.

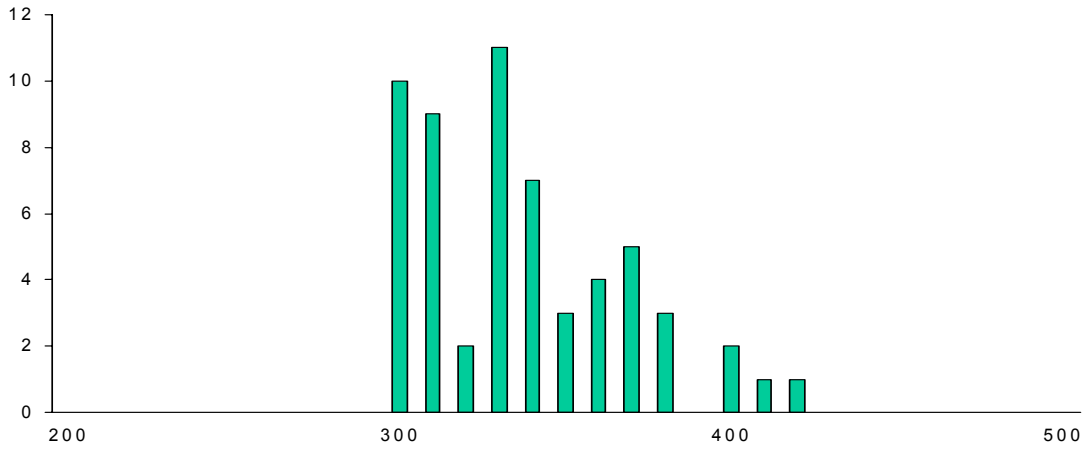

Figure 2. Length frequency distribution of smallmouth bass captured in the July 16, 1994 Ririe Reservoir bass tournament.

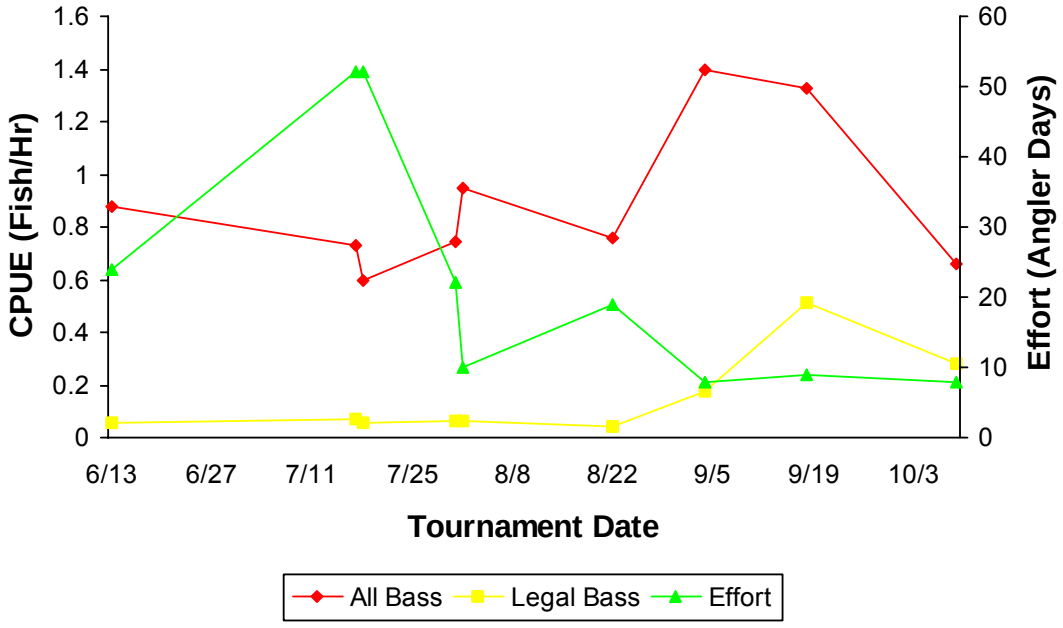

Figure 3. Catch per unit effort bass tournament data for Ririe Reservoir, 1993.

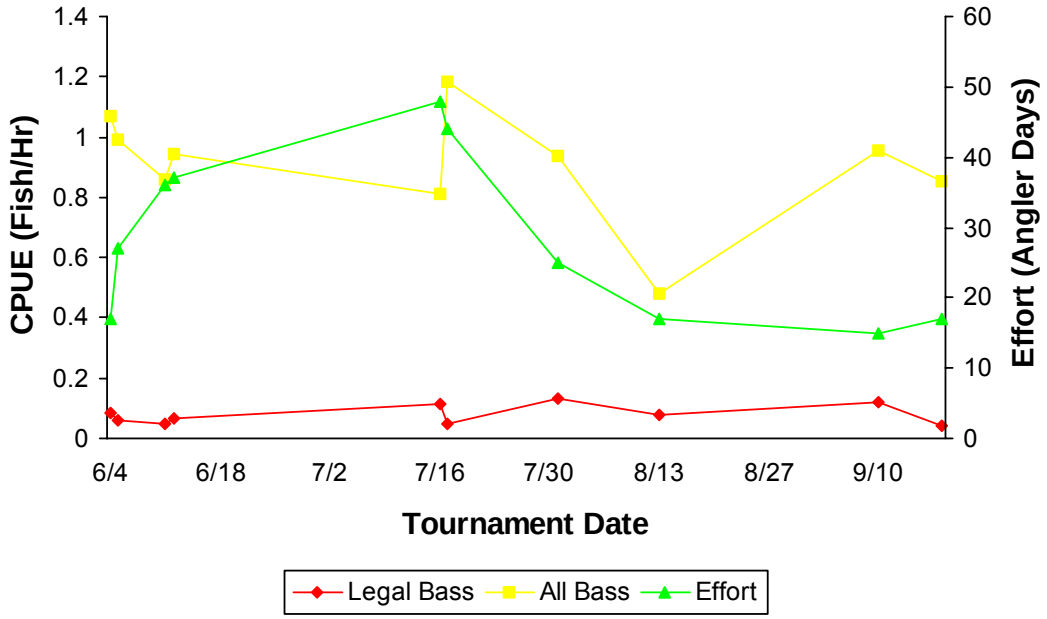

Figure 4. Catch per unit effort bass tournament data for Ririe Reservoir, 1994.

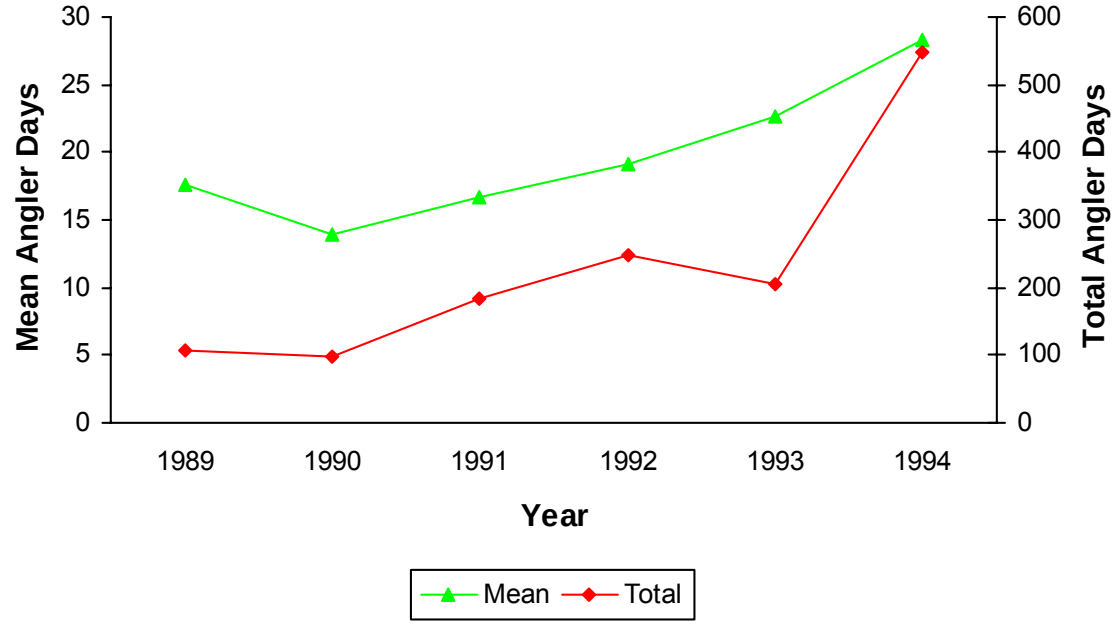

Figure 5. Effort estimates for bass tournaments on Ririe Reservoir (annual summaries) 1989-1994.

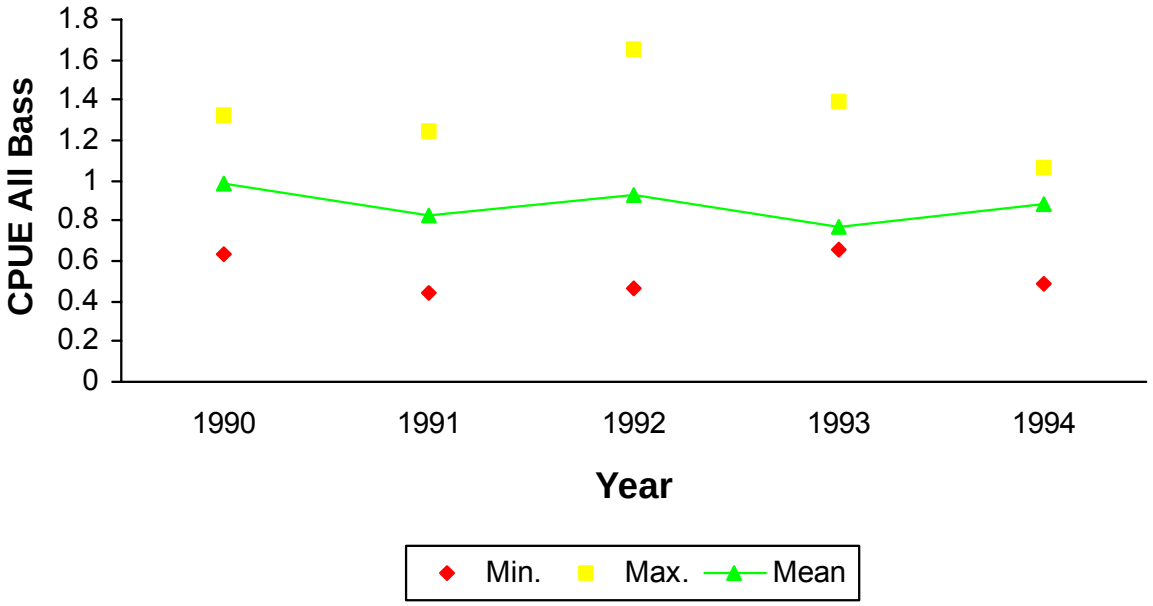

Figure 6. Annual catch per unit effort (fish per hour) for Ririe Reservoir bass tournaments, 1990-1994.

Early Season Opener

We conducted an opening day fishing effort survey at Ririe Reservoir to document the amount of new fishing opportunity gained with opening the season one month earlier than normal. We calculated from the data and anecdotal observations throughout the month of May that total annual effort on Ririe Reservoir may increase by as much as 30% due to the earlier opener. We believe it is a particularly valuable opportunity since it comes at a time when the general rivers and streams and Henrys Lake are closed to fishing.

Kokanee Trawling

Seven multi-step trawl tows netted 41 kokanee. Data analysis using the kokanee trawling software written Bruce Rieman indicates a total kokanee biomass of 4.6 kg/ha and a length frequency distribution with modes peaking at 45, 130, 250, and 340 mm. These results were not surprising since the reservoir has produced fair kokanee fishing for the past several years with excellent fishing for a few exceptional anglers. Unfortunately, there is strong evidence that a substantial number of kokanee were lost through the dam during the severe drawdown of fall 1994. We expect a possible decrease in the kokanee fishing catch-per-unit-effort in 1995, especially for larger fish.

Spillway Fish Kill

We found a few long-dead yellow perch *Perca flavescens* and kokanee in the spillway along with a strong hydrogen sulfide odor on September 3. We believe there may have been a significant fish kill due to the concentration of fish in the spillway that had been sucked through the dam and the poor water quality of the heavy hypolimnetic discharge. Few dead fish were probably left to be seen because of warm weather and accompanying high decomposition rates and the flushing effect of the approximately 700 cfs dam discharge.

Roberts Gravel Pond

Lowland Lake Survey

This low level sampling effort revealed the following: a fishable number of hatchery rainbow trout; high numbers of yellow perch, some harvestable at 7-9"; very abundant sunfish (bluegill *Lepomis macrochirus* and pumpkinseed *L. gibbosus*) which are generally substandard in length at 5-6"; good numbers of 8-9" bullhead *Ameiurus spp.;* and very little recruitment of stocked channel catfish *Ictalurus punctatus* to the sampling gear.

The minimal electrofishing effort that was made before an equipment failure netted a few hatchery rainbow trout and a number of small $\leq$100 mm yellow perch. There is no question that yellow perch reproduce in the pond naturally, although a fishery for desirable sized perch does not exist.

RECOMMENDATIONS

We recommend a more thorough monitoring of DO in winter 1995 and implementation of emergency measures as needed to sustain the fishery if a DO crisis is discovered. We also recommend a complete synthesis of all DO data for Mud Lake in the 1995 annual report.

Should the remarkable coincidence of more and bigger fish than usual running in a year with unusually low reservoir water levels occur again, it is recommended that we consider an emergency closure.

We recommend stocking the reservoir in spring 1995 with approximately 1,000 fin-clipped pre-spawn smallmouth bass to be electrofished from somewhere lower in the Snake River system. These fish will serve a triple purpose: to document downstream loss of smallmouth bass if found below the reservoir; to allow the calculation of a population estimate for smallmouth bass in Ririe Reservoir; and hopefully to help restore the population which is currently short of large adult spawners.

We recommend a more intense survey in 1995 of not only the fish population but also the limnological, benthic and morphological characteristics of the pond. If possible, an unstructured but frequent creel survey would also yield valuable information. If these types of information can be gathered, a management plan can be written for this popular but currently less than exciting fishery/water body.

1994 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fisheries Management F-71-R-19

Project I: Surveys and Inventories Subproject I-G: Upper Snake Region

Job: c[1] - South Fork Snake River Title: Rivers and Streams Investigations

Contract Period: July 1, 1994 to June 30, 1995

ABSTRACT

In the South Fork Snake River, a total of 918 individual trout were captured during two days of electrofishing inhe Palisades section in September 1994. Trout species composition and relative abundance were wild and hatchery cutthroat trout *Oncorhynchus clarki* (63%), wild rainbow trout *O. mykiss* and hybrids (33%), wild brown trout *Salmo trutta* (4%), and lake trout *Salvelinus namaycush* (<1%). A total of 1,104 individual trout were captured during three days (two marking runs) of electrofishing in the Conant section in October 1994. Trout species composition and relative abundance were wild and hatchery cutthroat trout (79%), wild rainbow trout and hybrids (9%), wild brown trout (12%), and kokanee *O. nerka kennerlyi* (<1%).

The proportion of cutthroat trout in the Palisades section has declined 20%, while wild rainbow and hybrid trout have increased over 20% since 1989. At Conant, over the same time period, the proportion of cutthroat has declined 10%, while wild rainbow and hybrid trout have increased 5%. At Conant, the cutthroat proportion is now the same as in 1982 prior to special regulations, whereas rainbow and hybrids have increased 8%. We consider these trends a serious threat to the genetic integrity and long-term viability of wild cutthroat populations in the South Fork Snake River.

The proportion of brown trout in the Palisades section has also declined since 1989 from 8% to 4% but may not be statistically significant. The proportion at Conant has varied from 7% to 13% since 1987 and from 7% to 19% since 1982, but there is no apparent trend.

Relatively large numbers of age 1 trout in both South Fork Snake River sections probably reflect good water conditions during their first year of life (1993). We cannot explain the relative decline in large rainbow, hybrid, and brown trout since 1989 and would have expected an increase after special regulations were implemented in 1992. Our results are confounded by our lack of density estimates and age and growth data.

The 1994 South Fork Snake River brown trout redd count was 306, the lowest count since 1984. This continues a downward trend since the record count in 1991 (889 redds), although counts were less than 300 prior to and including 1984. On average, about half again as many redds were counted using rotary-wing aircraft (447) compared to fixed-wing aircraft counts (306) in 1994.

Significant numbers (941) of wild cutthroat trout fry were captured moving downstream in Rainey Creek, a tributary of the South Fork Snake River, from mid-July to early October 1994. Fewer yearlings (43) and adults (14) were captured. We do not know to what extent outmigration occurred prior to or after these dates when the trap was not operating. Most fry movement occurred after mid-August and peaked in early October. Captured fry were mostly <4 in (102 mm) or what we believe to be age 0. The average size of all captured fish (n=998) was 2.08 in (53 mm), but the median was 1.57 in (40 mm).

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INTRODUCTION AND STUDY SITE

Trout populations in the South Fork Snake River are monitored annually using electrofishing (all species) and an aerial count of redds (brown trout *Salmo trutta*). Four river sections have been electrofished in various years since 1986 (Figure 1): Palisades (5.0 km), Conant (4.9 km), Twin Bridges (2.9 km), and Lorenzo (4.8 km). However, only the Conant section has been electrofished every year. Brown trout redds have been counted since 1979. The last full creel census was conducted in 1982 (Moore and Schill 1984).

Special regulations restricting harvest of cutthroat trout *Oncorhynchus clarki* were enacted in 1984 upstream of the Heise measuring cable to Irwin and extended to Palisades Dam in 1988. Based on this success, the Upper Snake restricted cutthroat harvest regulation was implemented in 1990 and included the lower South Fork Snake River (below Heise) and all South Fork Snake River tributaries. The two fish, none between 8-16 in regulation was extended to all trout species in the mainstem in 1992. The lower river (below the Heise cable) is open year round to fishing, whereas the upper river is closed December 1 to Memorial Day weekend.

Rainey Creek (Figure 1) is a tributary of the South Fork Snake River and drains a watershed of 56.3 mi^2 (145.8 km^2) in the northern half of Swan Valley (Moore and Schill 1984). Moore and Schill logically divided the stream into upper and lower sections. Although flows vary from 20 to 347 cfs (0.6 to 10 cms) in the upper section, as Rainey Creek flows south out of the Big Hole Mountains it enters a porous alluvium and often becomes dry near five irrigation diversions. Springs provide significant recharge to the channel as it continues to meander through Swan Valley to the South Fork Snake River. Miller and Roby (1957) first identified fish migration problems at these irrigation diversions, and they considered the drainage to have the greatest potential for substantial increases in recruitment to the South Fork Snake River. Moore (1980, 1981) noted degradation in lower Rainey Creek was severe from dewatering and siltation. Rainey Creek has changed little since these descriptions.

In April 1994 we assisted the Idaho Department of Fish and Game (IDFG) Engineering Bureau with initial scoping and survey work for a diversion/ladder preliminary design. About the same time, Soil Conservation Service (SCS) and Palisades Irrigation Company proposed a gravity-feed sprinkler irrigation project that would affect flows in both Rainey and Palisades creeks. Because their project would alter our construction and operation plans and might provide passage flows in Rainey Creek, we put the diversion/ladder project on hold.

In June, we agreed with Trout Unlimited, U.S. Forest Service, and Bureau of Land Management personnel to use allocated seed money to evaluate cutthroat trout run status in Rainey Creek. The existence of this run was doubtful as documented by previous research (Moore 1981; Moore and Schill 1984) and because of low flows during the recent drought (water years 1987-92). Moore (1981) and Moore and Schill (1984) concluded that Rainey Creek produced few cutthroat or brown trout recruits to the South Fork Snake River during 1980 and 1981 even though substantial numbers of brown trout had been found spawning in the lower section. They used a weir to trap upstream and downstream migrating adults and juveniles and a Krey-Meekin trap to capture outmigrating fry. They also used backpack electrofishing gear to determine presence, location, and abundance of fish.

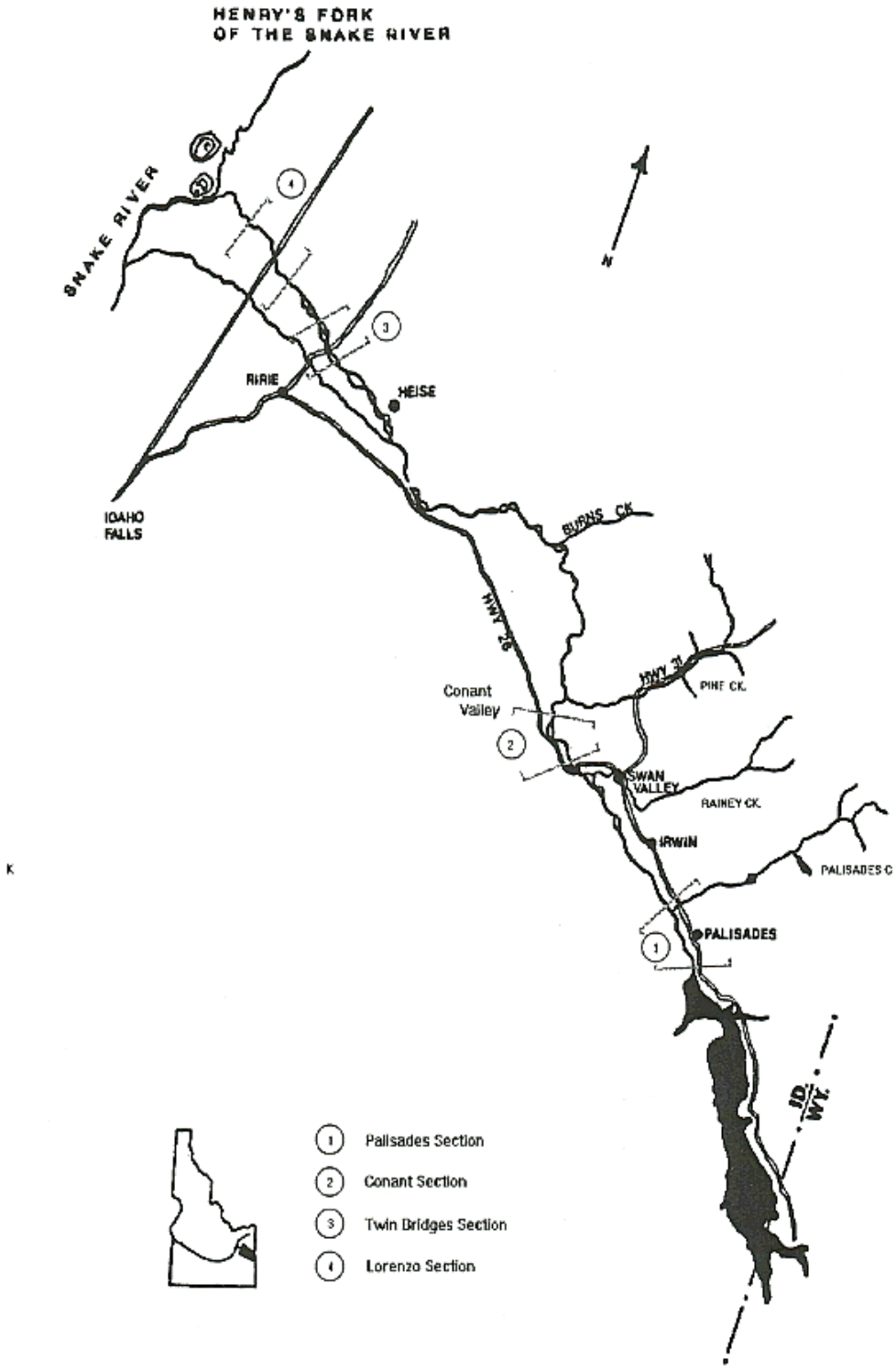

Figure 1. Map of South Fork Snake River showing electrofishing sections.

OBJECTIVES

1. Monitor South Fork Snake River trout populations by electrofishing and redd counts.

2. Enter current and historical (to 1986) South Fork Snake River electrofishing data into MR4 computer program for standardized database and analysis.

3. Determine the extent of juvenile cutthroat trout outmigration from Rainey Creek, a South Fork Snake River tributary, in late summer and early fall. Estimate timing and size of juveniles outmigrating.

4. Inventory upper Rainey Creek (above several irrigation diversions and a proposed diversion/ladder facility) for cutthroat trout spawners and redds. This work was contracted to Dr. Jack Griffith, Idaho State University, by the Upper Snake River Cutthroats Chapter of Trout Unlimited/Federation of Fly Fishermen and is presented in Appendix B.

METHODS

Electrofishing

During 1994, we electrofished the Palisades section September 19-20 and the Conant section on October 7, 11, and 14. Due to unsuitable flow conditions, only two marking runs were completed in each section, and we were unable to work in the other sections (Lorenzo and Twin Bridges). Boat breakdown forced us to return to Conant to finish the second marking run. The Palisades section was shortened to 5.0 km in 1994 to avoid running a rapid just below Palisades Creek.

Fish were captured using direct-current (DC) electrofishing gear (Coffelt VVP-15 powered by a Honda 5000 W generator) mounted in an 18 foot Alumaweld jet sled. We used pulsed DC current through two boom-and-dangler anodes fixed to the bow while driving downstream. The boat hull was the cathode. VVP settings were at 300-350 V, 7-8 A, 25% pulse width, and 20 Hz (pulses per second). Water temperatures varied from 10 to 16^{o}C, conductivity varied from 240 to 445 umHOS/cm, and flows varied from 1,220 to 6,420 cfs (at Irwin gage; USGS provisional data). Though sections were not blocked at each end, we assumed fish would not move beyond natural habitat boundaries.

We attempted to capture all species and sizes of trout; mountain whitefish *Prosopium williamsoni* and nongame fish were ignored due to time constraints. Fish were anesthetized with MS-222 (tricaine methane-sulfonate), identified, measured to the nearest millimeter (TL), and weighed to the nearest gram. Scale samples were taken near the caudal peduncle dorsal to the lateral line and ventral to the adipose fin. Incidental fish mortalities were put on ice, frozen at the end of the day, and later dissected for otoliths. Brown trout less than 6 in (150 mm) and all other species less than 4 in (100 mm, approximately age 0) were not marked; age 1 and older fish were marked with a caudal fin punch and then released.

We assumed capture probabilities did not vary with species, and we estimated relative abundance using proportions of individual (or new) fish captured. Although capture probabilities vary with fish length (Schill 1992), population size structures (length frequency distributions) were estimated from all sizes of individual fish captured. We were unable to estimate population densities or standing crops because we could not make the recapture runs.

Due to time constraints, age and growth analysis was not completed for 1994 data. Scales were hot-pressed (to minimize distortion) into acetate sheets using a Carver Model C, 12 ton press at 175^{o}F and 20,000 lb for 1.5 minutes. The sheets were archived, along with otoliths from incidental mortalities, for future analysis. Ages and distances to annuli will be read using a Northwest Microfilm Model 385 projector according to Jearld (1983). Data will be analyzed using the DISBCAL 89 program (Frie 1982; Missouri Department of Conservation 1989) when we get the software and hardware on line.

Length-weight regressions for 1994 will be developed at a later date using Palisades and Conant data.

MR4 Data Entry

Current and historical South Fork Snake River electrofishing data were entered and checked using the MARKRECAPTURE 4.0 computer program (MR4; Montana Department of Fish, Wildlife, and Parks 1994). We entered raw data from all four sections and for all years dating back to 1986. Because weight data was not collected prior to 1994, weights for those years will be dubbed in later using our length-weight regressions.

Brown Trout Redd Survey

The annual brown trout aerial redd count was conducted December 18, 1994, using a fixed-wing Maule M5-235C. Counts were made as in previous years by flying downstream from Palisades Dam to the confluence with the Henrys Fork. In addition, we used a rotary-wing Bell 476 Soloy with two observers to count redds on December 22. The purpose of the second flight was to compare fixed-wing with rotary-wing counts and recommend if the slower, more expensive latter aircraft is justified.

Rainey Creek Fry Trapping

We operated a fry trap in Rainey Creek from July 17 to October 4,1994, to capture most fish moving downstream to the South Fork Snake River. We installed the trap with assistance from local Trout Unlimited volunteers and Targhee National Forest personnel. It was located at the proposed diversion/ladder site on the National Forest boundary (S34, T41N, R44E) about 7 miles above the confluence with the South Fork Snake River.

The trap consisted of one-quarter inch mesh hardware cloth leads extending from each stream bank to a fyke net attached to a holding box. The box was checked twice daily (morning and evening) by Idaho Department of Fish and Game personnel and Trout Unlimited volunteers until debris shut us down in early October.

After capture, fish were anesthetized with tricaine methane sulfonate (MS-222), identified, and measured to the nearest cm (TL). They were allowed to recover and then hauled to lower Rainey Creek near Swan Valley and released.

RESULTS AND DISCUSSION

Electrofishing

Palisades

A total of 918 individual trout were captured during two days of electrofishing in September 1994. Trout species composition and relative abundance (Figure 2; Appendix A Table 1) were wild and hatchery cutthroat (63%), wild rainbow and hybrid (33%), wild brown (4%), and lake trout (<1%). We believe hatchery cutthroat (finespotted) and lake trout are flushed from Palisades Reservoir; their numbers may be directly related to the extent of reservoir drawdown (Gamblin et al. 1993).

The proportion of cutthroat trout (wild and hatchery) captured by electrofishing has declined 20% while wild rainbow and hybrid have increased over 20% since 1989 (Appendix A Table 1). We view the 1987 data with caution as sampling was conducted in March rather than September and the sample size was small (n=301); however, the rainbow and hybrid trend still holds using this information. We consider these trends a serious threat to the genetic integrity and long term viability of wild cutthroat trout populations in the South Fork Snake River.

We dismiss the possibility that hatchery cutthroat trout, or wild finespotted cutthroat, flushed from the reservoir have declined and are the cause of these trends. First, Palisades Reservoir was drawn down a record 98% in 1994, and we would expect an increase, not decrease, in reservoir cutthroat in the South Fork Snake River (Gamblin et al. 1993). Second, sample sizes were similar in 1989, 1991, and 1994 (about 1,000 fish), and absolute numbers of wild rainbow and hybrids captured have increased from <100 to >300 (Appendix A Table 1). Further, wild rainbow and hybrid electrofishing efficiencies have not increased, but rather have decreased since 1989 (Appendix A Table 2), probably as average sizes of fish captured have declined.

We believe hatchery finespotted cutthroat trout originating from the reservoir cannot be accurately distinguished from wild riverine cutthroat as previous authors have reported (Gamblin et al. 1993; Corsi and Elle 1989, 1994). We attempted, but abandoned, trying to distinguish them in 1994, as hatchery fish identification was not possible (using eroded fins, spotting patterns, etc.). Accurate means of identifying or marking hatchery fish need to be developed for future monitoring of wild populations in this section.

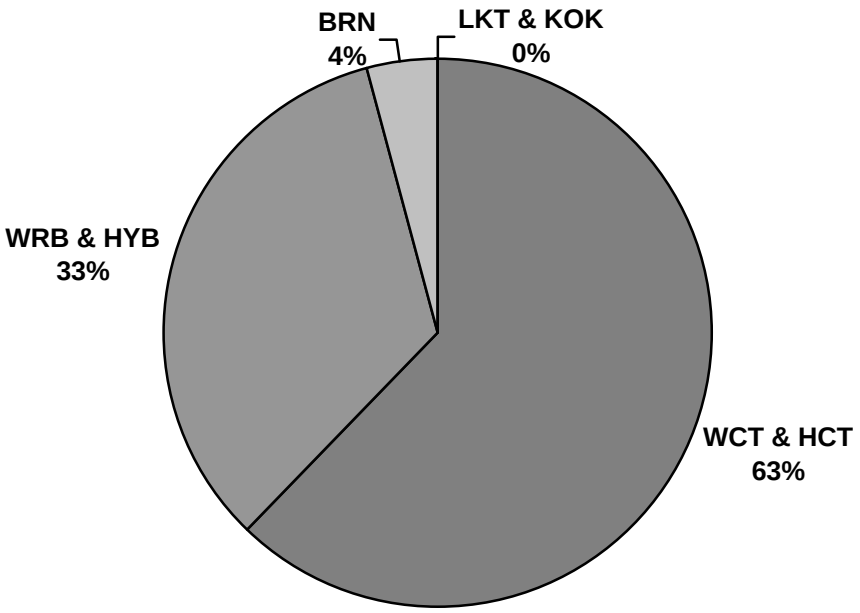

Figure 2. Trout species composition and relative abundance (%) at the Palisades electrofishing section, South Fork Snake River, September 1994. Total individual fish captured during marking runs = 918. Results are from MR4 database for all sizes of fish.

Table 1. Fixed wing versus rotary wing brown trout redd counts on the South Fork Snake River, 1994.

Location	12/18/94 fixed wing	12/22/94 rotary wing			Difference (rotary - fixed)
		Observer 1	Observer 2	Mean	
Afterbay	56	85	NC[a]	85	29
Afterbay - Irwin Abutments	20	0	0	0	-20[b]
Irwin - Conant Ramp	22	46	37	42	20
Conant - Burns Creek	109	148	129	138	29
Burns - Anderson Diversion	53	65	83	74	21
Anderson - Heise Bridge	0	0	0	0	0
Heise - Mouth	46	113	104	108	62
Total	306	457	438	447	141

[a] NC = Not counted.
[b] Redds counted by fixed wing were “false” redds, i.e. mats of brown algae.

Age 1 and older cutthroat trout are easily distinguished from similar-aged rainbow and most hybrids using color, spotting patterns, and morphology. We believe we have been consistent with past authors in distinguishing these two species and their hybrids. Accurate means of identifying age 0 cutthroat, rainbow, and hybrids need to be developed for relative abundance monitoring; they were not included in past density estimates due to low recapture efficiencies.

The proportion of brown trout captured by electrofishing has also declined since 1989, but the trend may not be statistically significant (Appendix A Table 1). The large proportion captured in spring 1987 may reflect holdover from spawning.

Wild and hatchery cutthroat trout length frequency distributions show good representation of what we believe are age 0 (<4 in or 102 mm), age 1 (6-10 in or 152-254 mm), and age 3 and older (>14 in or 356 mm) groups (Figure 3). Relatively low numbers of age 2 (10-14 in or 254-356 mm) fish probably reflects poor water conditions during spring and summer 1992 when they were incubating and rearing, and during winter 1992-1993 when flows (1,210 cfs at Irwin) were below minimum recommended levels (1,500 cfs; Schrader and Griswold 1994).

Wild rainbow and hybrid trout (Figure 4) and brown trout (Figure 5) length frequency distributions show what we believe are large age 1 groups (6-10 in or 152-254 mm) but relatively few fish in other age groups. Large numbers of age 1 fish probably reflects good mainstem water conditions during their first year of life (spring and summer 1993, and winter 1993-1994) when flows (1,440 cfs at Irwin) were near recommended levels. We note, however, that rainbow and hybrids are probably increasing in this section while brown trout may be decreasing.

Our results are confounded by our lack of density estimates, our lack of age and growth data for previous years and, for cutthroat trout, our inability to distinguish wild from hatchery fish. This will be resolved for future monitoring.

Conant

A total of 1,104 individual trout were captured in October 1994 during three days (two marking runs) of electrofishing. Trout species composition and relative abundance (Figure 6; Appendix A Table 1) were wild and hatchery cutthroat (79%), wild rainbow and hybrid (9%), wild brown (12%), and kokanee salmon (<1%). We believe hatchery cutthroat (finespotted) and kokanee are flushed from Palisades Reservoir; their numbers may be directly related to the extent of reservoir drawdown (Gamblin et al. 1993).

The proportion of cutthroat trout (wild and hatchery) captured by electrofishing has declined 10% while wild rainbow and hybrids have increased 5% since 1989 (Appendix A Table 1). The cutthroat proportion is now the same as in 1982, prior to special regulations, whereas the rainbow and hybrid proportion has increased 8%. We view the 1982 and 1987 data with caution as sampling was conducted in November rather than October, and sample sizes were small (n=229 in 1982, n=348 in 1987). However, the rainbow and hybrid trend still holds using this information. This supports our data for Palisades, and we consider these trends a serious threat to the genetic integrity and long term viability of wild cutthroat trout populations in the South Fork Snake River.

For the same reasons stated above for Palisades, we dismiss the possibility that hatchery cutthroat trout or wild finespotted cutthroat flushed from the reservoir have declined and are the cause of these trends. In addition, the Conant section is located further downstream than the Palisades section and is less influenced by fish flushed from the reservoir.

Comparable to Palisades, we believe hatchery finespotted cutthroat originating from the reservoir cannot be accurately distinguished from wild riverine cutthroat as previous authors have reported (Gamblin et al. 1993; Corsi and Elle 1989, 1994). Accurate means of identifying or marking hatchery fish need to be developed for future monitoring of wild populations in this section, although it is less critical than for Palisades.

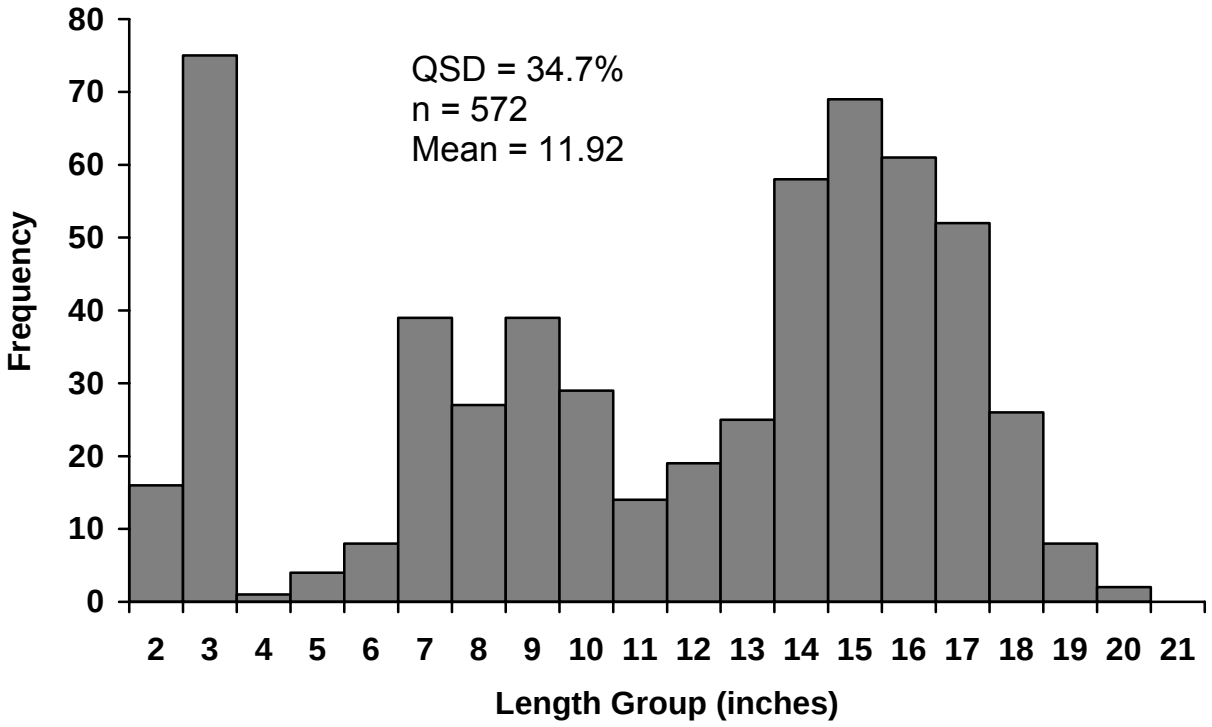

Figure 3. Length frequency distribution of wild and hatchery cutthroat trout captured at the Palisades electrofishing section, South Fork Snake River, September 1994. Total individual fish captured during marking runs = n. Results are from MR4 database for all sizes of fish.

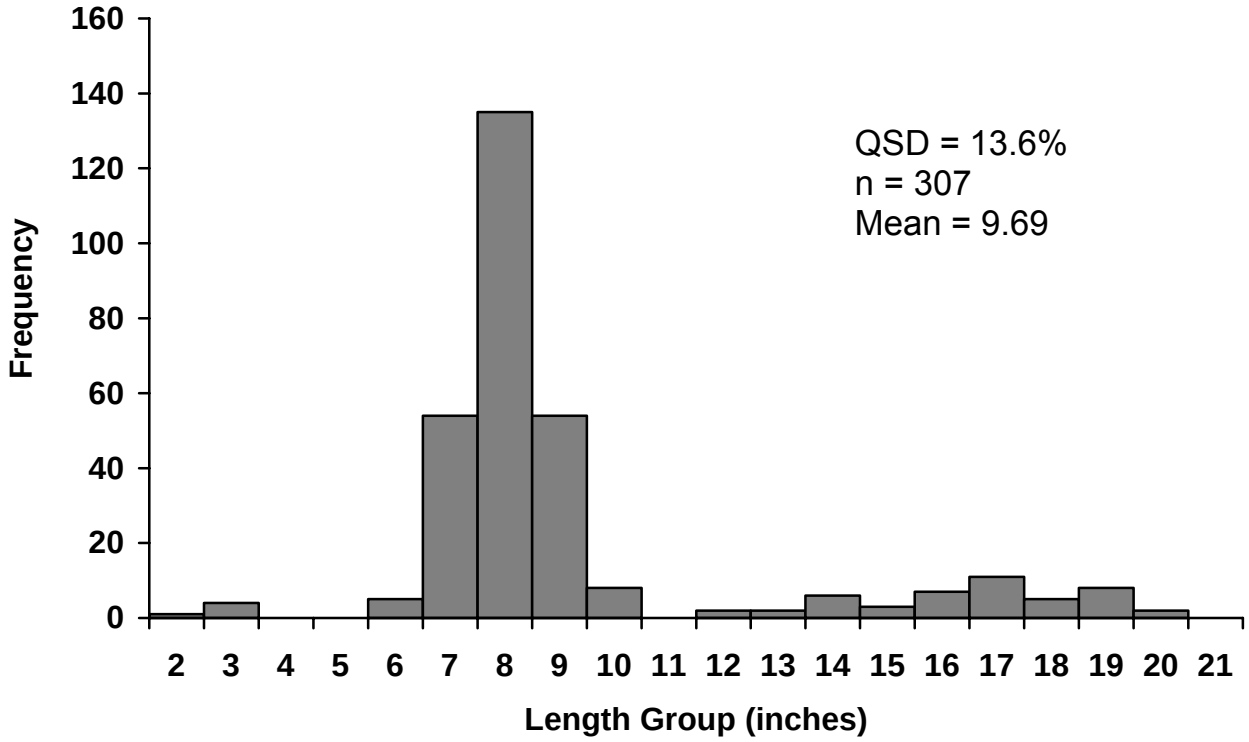

Figure 4. Length frequency distribution of wild rainbow and hybrid trout captured at the Palisades electrofishing section, South Fork Snake River, September 1994. Total individual fish captured during marking runs = n. Results are from MR4 database for all sizes of fish.

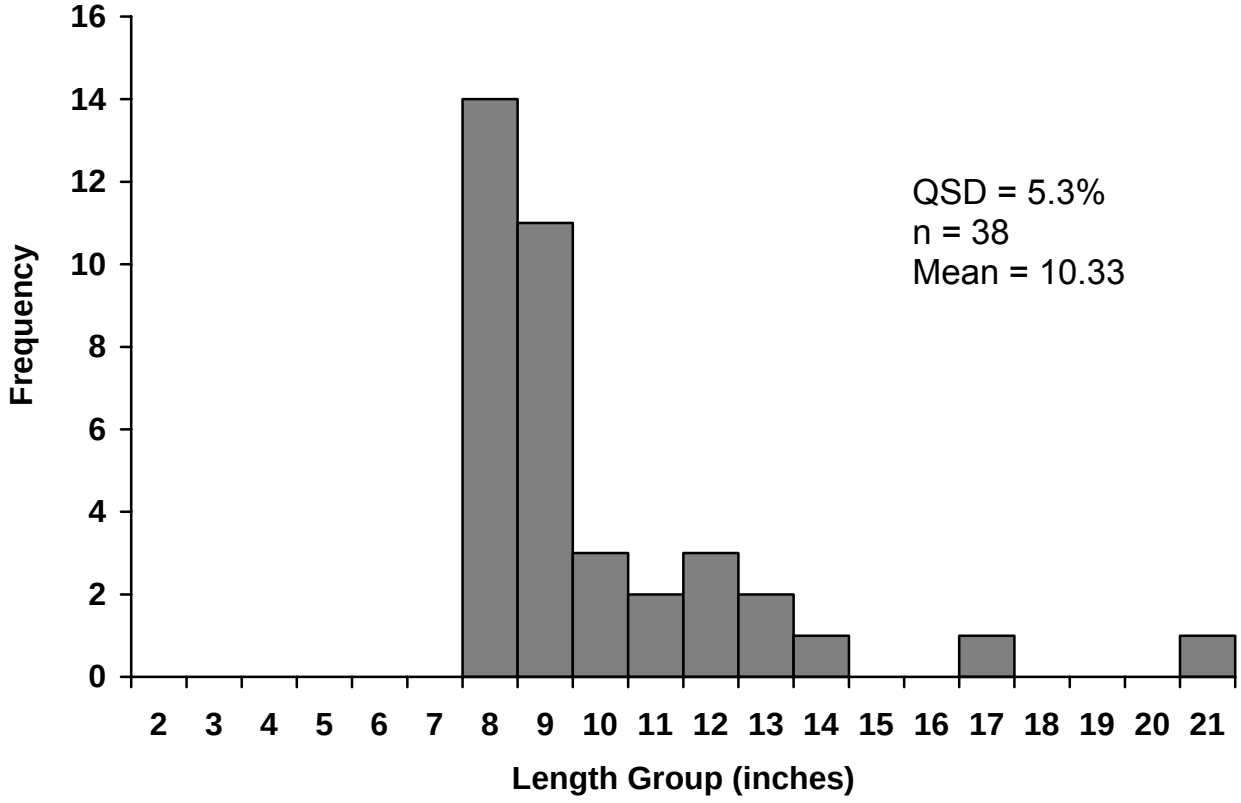

Figure 5. Length frequency distribution of wild brown trout captured at the Palisades electrofishing section, South Fork Snake River, September 1994. Total individual fish captured during marking runs = n. Results are from MR4 database for all sizes of fish.

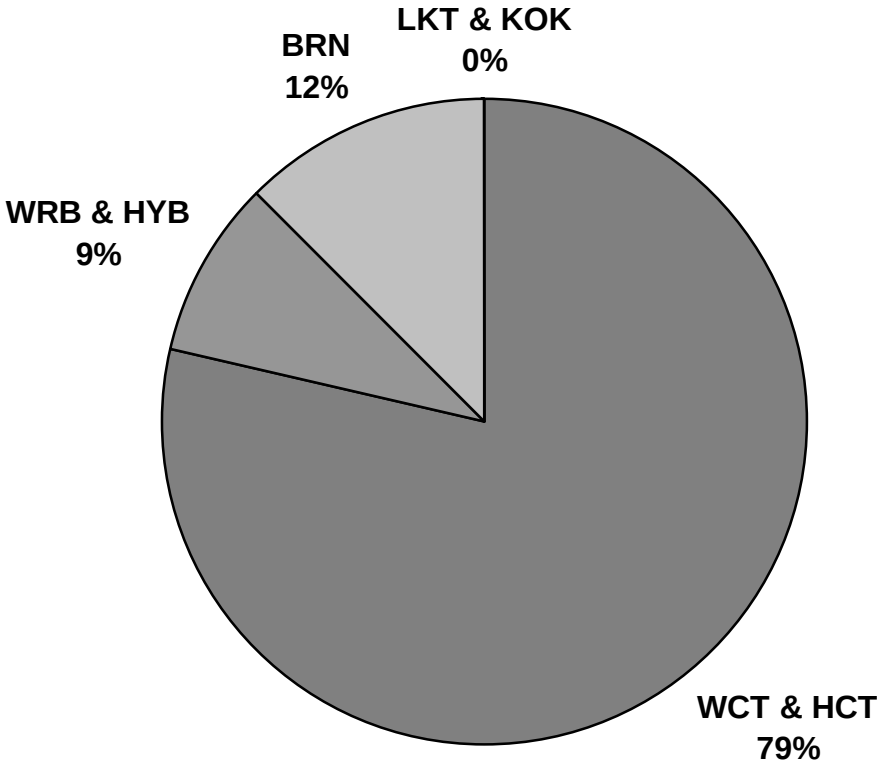

Figure 6. Trout species composition and relative abundance (%) at the Conant electrofishing section, South Fork Snake River, October 1994. Total individual fish captured during marking runs = 1104. Results are from MR4 database for all sizes of fish.

Like Palisades, age 1 and older cutthroat trout are easily distinguished from similar-aged rainbow and most hybrids using color, spotting patterns, and morphology. We believe we have been consistent with past authors in distinguishing these two species and their hybrid. Accurate means of identifying age 0 cutthroat, rainbow, and hybrids need to be developed for relative abundance monitoring; they were not included in past density estimates due to low recapture efficiencies.

The proportion of brown trout captured by electrofishing has varied from 7 to 13% since 1987, and from 7 to 19% since 1982 (Appendix A Table 1). Unlike Palisades, there is no apparent trend.

Like Palisades, wild and hatchery cutthroat trout length frequency distributions show good representation of what we believe are age 0 (<4 in or 102 mm), age 1 (6-10 in or 152-254 mm), and age 3 and older (>14 in or 356 mm) groups (Figure 7). Relatively low numbers of age 2 (10-14 in or 254-356 mm) fish probably reflects poor water conditions during spring and summer 1992, when they were incubating and rearing, and during winter 1992-1993 when flows (1,210 cfs at Irwin) were below minimum recommended levels (1,500 cfs; Schrader and Griswold 1994). Relatively high numbers of age 1 fish probably reflects good water conditions during their first year of life (spring and summer 1993 and winter 1993-1994) when flows (1,440 cfs at Irwin) were near recommended levels.

Like Palisades, wild rainbow and hybrid trout (Figure 8) and brown trout (Figure 9) length frequency distributions show what we believe are large age 1 groups (6-10 in or 152-254 mm) but relatively few fish in other age groups. Similar to cutthroat, large numbers of age 1 fish probably reflects good mainstem water conditions during their first year of life. We note, however, that rainbow and hybrids are probably increasing in this section while brown trout are probably stable.

Like Palisades, our results are confounded by our lack of density estimates, our lack of age and growth data for previous years and, for cutthroat trout, our inability to distinguish wild from hatchery fish. This will be resolved for future monitoring.

Brown Trout Redd Survey

The 1994 brown trout redd count was 306, the lowest count since 1984 (Figure 10; Appendix A Table 3). This continues a downward trend since the record count in 1991 (889 redds), although counts were less than 300 prior to and including 1984. Redds counted in 1994 in each section except the Afterbay-Irwin section were less than half of those counted in 1991.

However, the 20 redds counted in the Afterbay-Irwin section in 1994 were later determined to be “false” redds, i.e. mats of brown algae. Although low counts in 1993 and 1994 may be the result of different observers used (e.g. distinguishing multiple or superimposed redds), we do not believe this would result in the magnitude of the decline. Flying times and conditions during 1993 and 1994 were similar to past years.

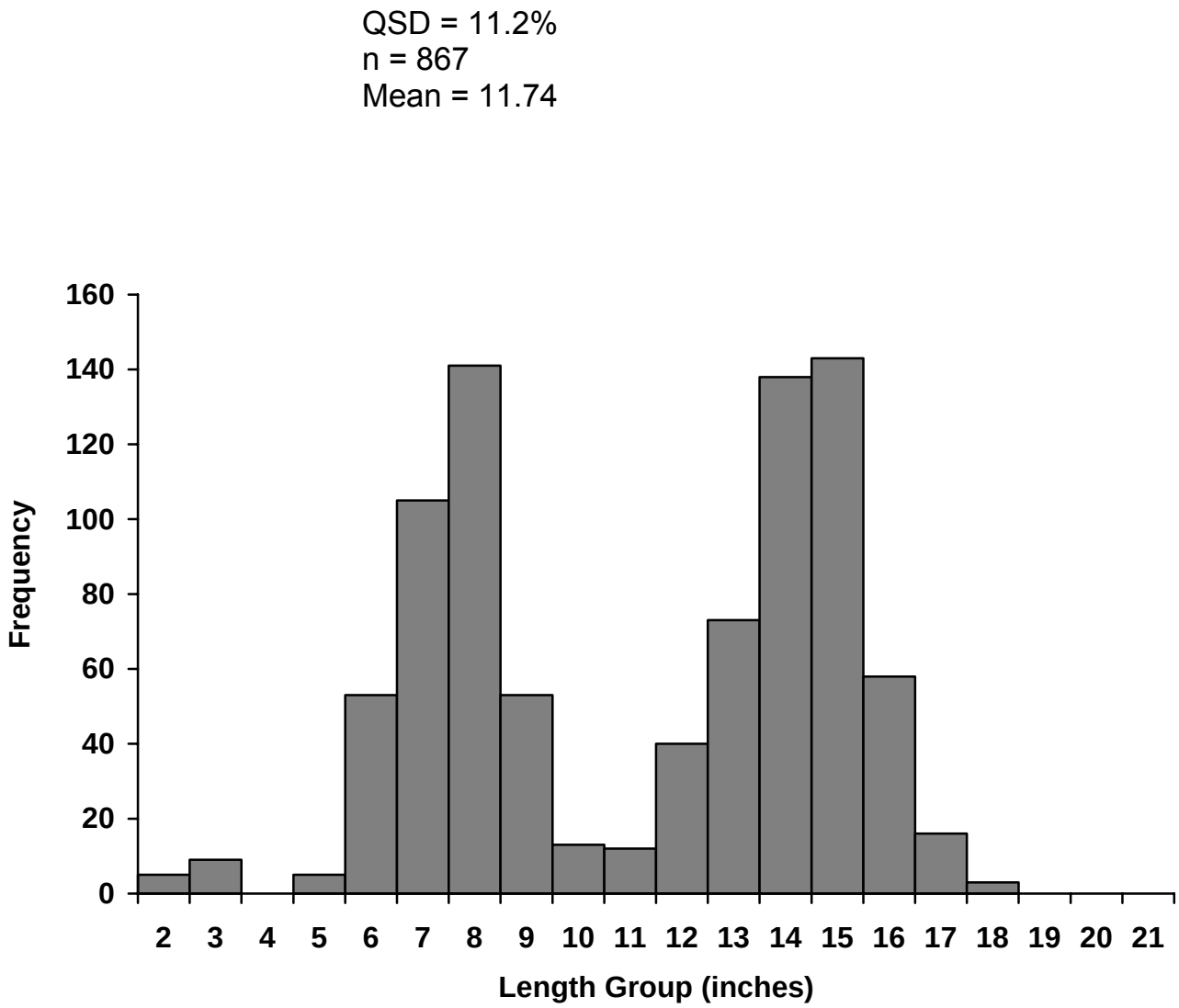

Figure 7. Length frequency distribution of wild and hatchery cutthroat trout captured at the Conant electrofishing section, South Fork Snake River, October 1994. Total individual fish captured during marking runs = n. Results are from MR4 database for all sizes of fish.

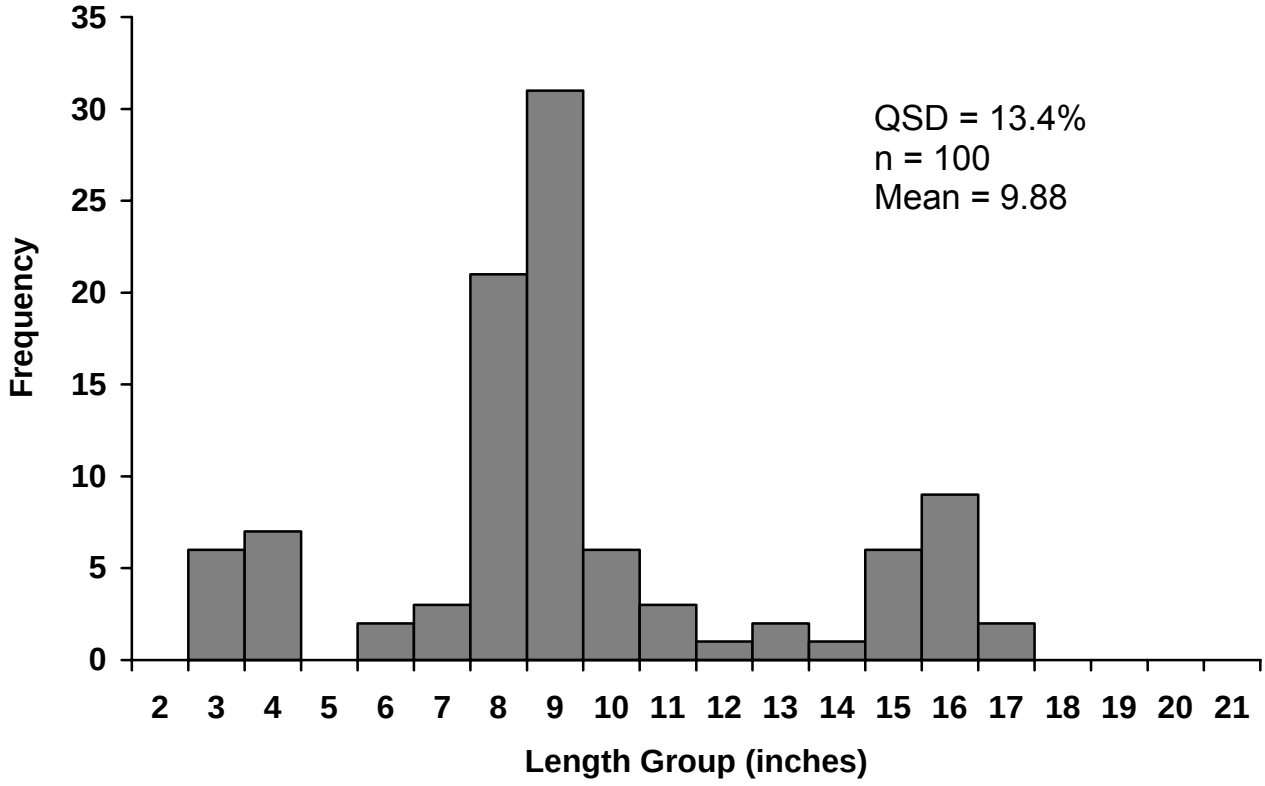

Figure 8. Length frequency distribution of wild rainbow and hybrid trout captured at the Conant electrofishing section, South Fork Snake River, October 1994. Total individual fish captured during marking runs = n. Results are from MR4 database for all sizes of fish.

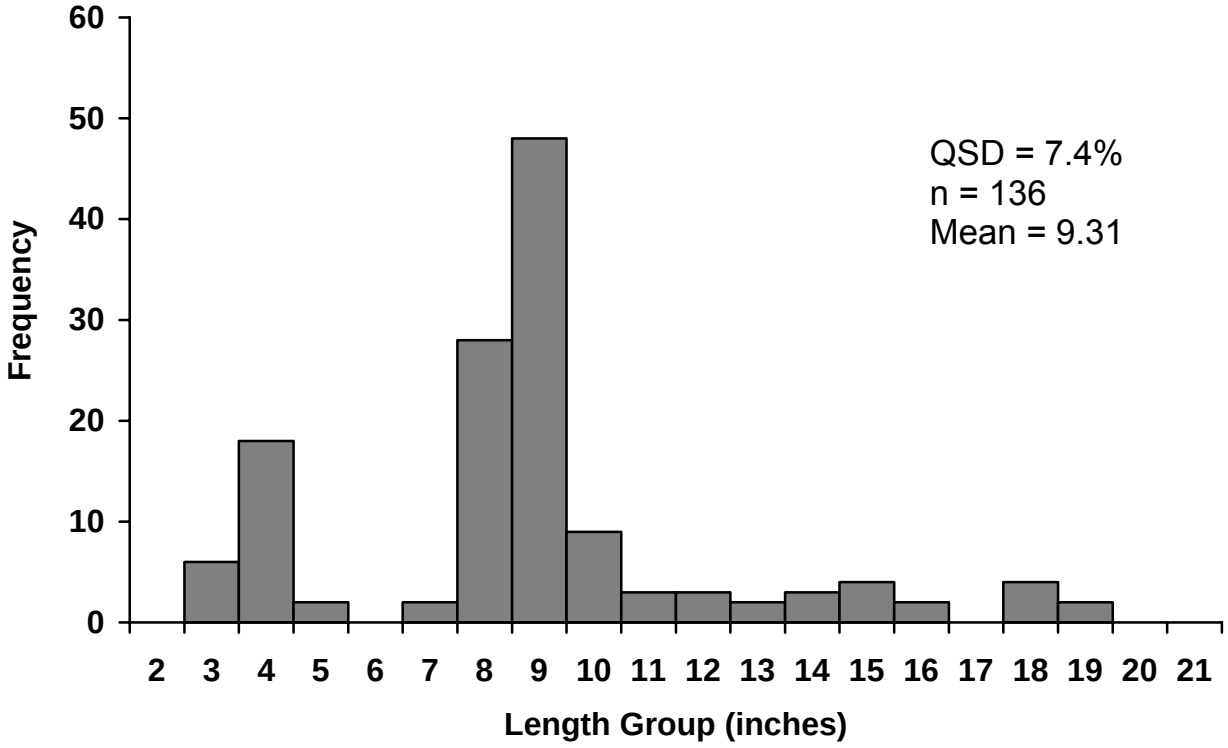

Figure 9. Length frequency distribution of wild brown trout captured at the Conant electrofishing section, South Fork Snake River, October 1994. Total individual fish captured during marking runs = n. Results are from MR4 database for all sizes of fish.

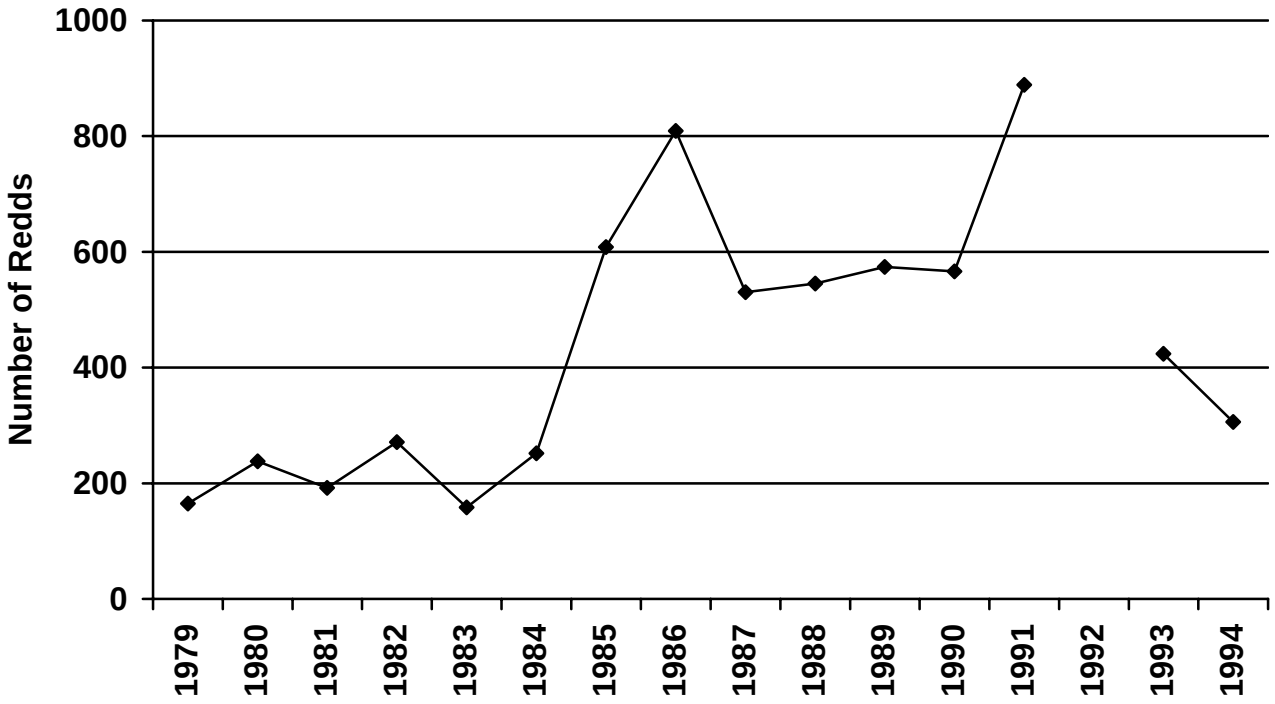

Figure 10. Brown trout redds counted in December, 1979-1994, South Fork Snake River.

On average, about 50% more redds were counted using rotary-wing aircraft (447) compared to fixed-wing aircraft (306; Table 1). The difference is attributed to the rotary-wing's slower flying speed, ability to circle tightly and make several counts, and better conditions for the observer (better viewing, lack of motion sickness). We will use rotary wing aircraft in the future.

Rainey Creek Fry Trapping

Significant numbers (941) of wild cutthroat trout fry were captured moving downstream in upper Rainey Creek from mid-July to early October 1994 (Figure 11). Fewer yearlings (43) and adults (14) were captured. In contrast, Moore (1981) captured only four cutthroat trout (age unknown) at a weir and Krey-Meekin trap operated in lower Rainey Creek from June 30 to October 12, 1980. Large mats of drifting aquatic vegetation confounded his results by continually clogging and occasionally washing out the gear. However, little movement of trout was detected when the gear was operating properly. When the Krey-Meekin trap was moved to upper Rainey Creek (near our trap location), only 12 cutthroat trout fry were captured from October 23 to November 7, 1980. Moore and Schill (1984) also captured fewer numbers of cutthroat trout fry (27), juveniles (56), and adults (8), than we did after moving their weir upstream (location unknown) and operating it from March 17 to December 14, 1981.

Most cutthroat trout fry movement occurred after mid-August and peaked in early October, 1994 (Figure 11). We do not know to what extent outmigration occurred prior to mid-July or after early October when the trap was not operating. Outmigration timing in 1994 was significantly different from that observed in 1981, when most downstream movement occurred prior to mid-July and ceased completely by early August (Moore and Schill 1984). The authors noted that this timing was much different from that observed for other South Fork Snake River tributaries, and they speculated it was due to resident fish being pushed downstream in high spring flows rather than actual outmigration to the South Fork Snake River.

Cutthroat trout fry moving downstream in 1994 were mostly <4 in (102 mm) or what we believe to be age 0 (Figure 12). Scale samples were not taken to age fish. The average size of all captured fish (n=998) was 2.08 in (53 mm), but the median was 1.57 in (40 mm). The length frequency distribution and average size were similar to that reported for outmigrants trapped in Burns and Pine creeks in the early 1980's (Moore and Schill 1984).

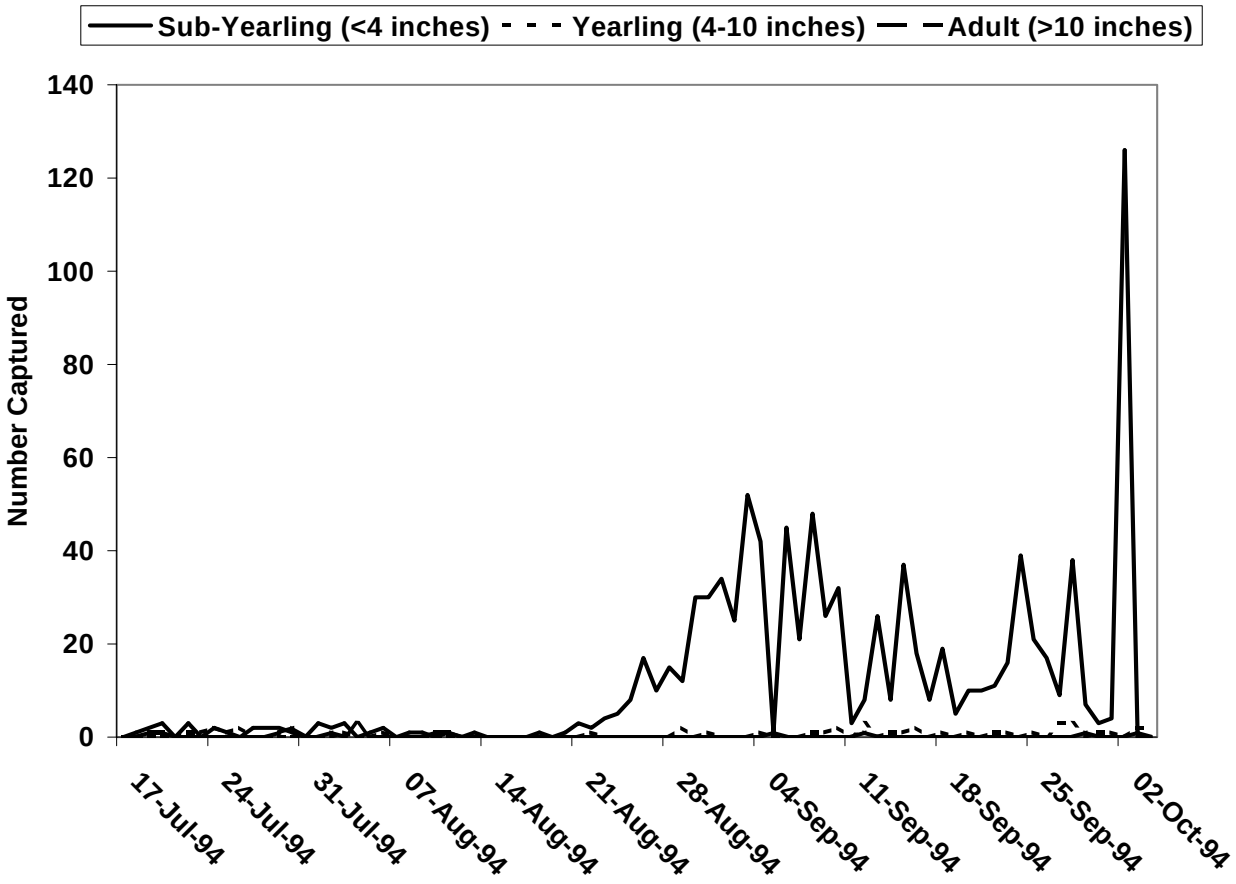

Figure 11. Number of wild cutthroat trout fry (n=941), yearlings (n=43), and adults (n=14) captured daily moving downstream in Rainey Creek, July 17 to October 4, 1994. Ages are approximate and were not validated.

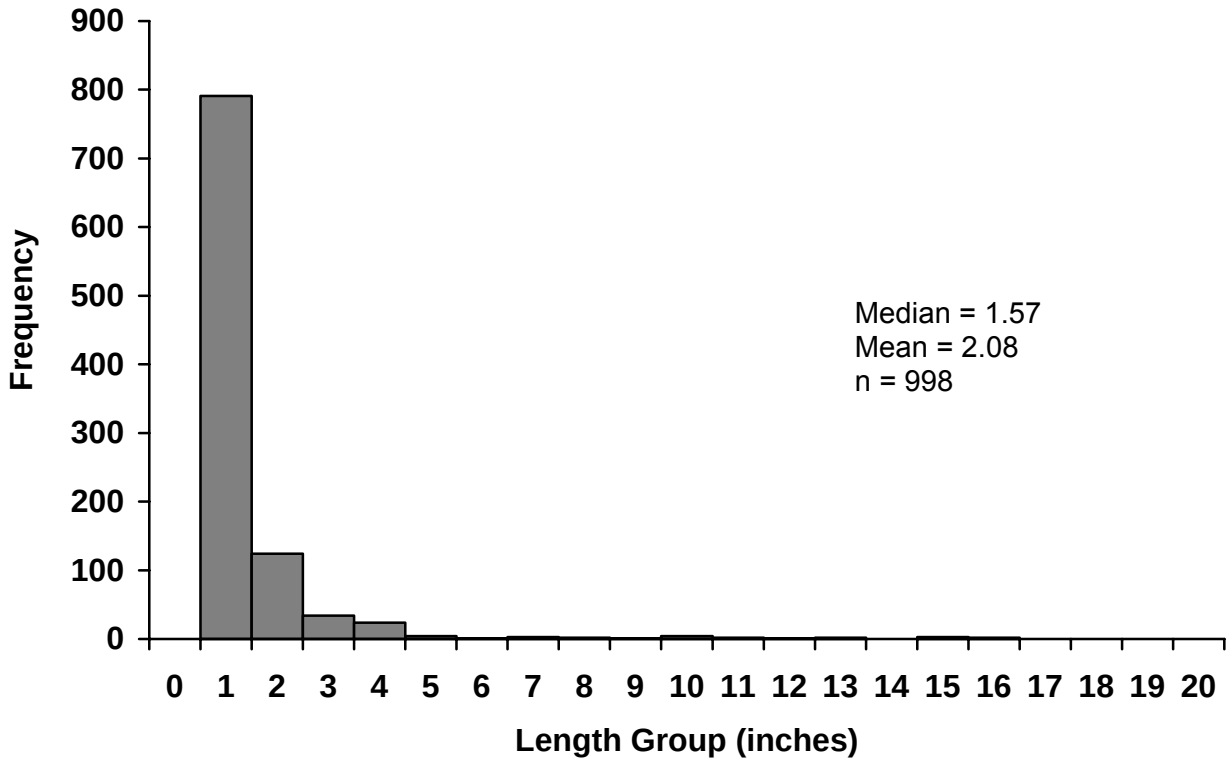

Figure 12. Length frequency distribution of wild cutthroat trout captured moving downstream in Rainey Creek, July 17 to October 4, 1994. Total fish captured = n.

RECOMMENDATIONS

1. Continue monitoring South Fork Snake River trout populations in the main stem by electrofishing and redd counts. Utilize guidelines presented in this document. Summarize historic electrofishing data, 1986-present, using the MR4 computer program.

2. Continue collecting electrofishing data to develop length-weight regressions for each wild trout species. Test for significant spatial or temporal differences. Predict fish weights from measured lengths, 1986-1993. Use to estimate standing crops.

3. Continue collecting fish bony structures (scales and/or otoliths) to accurately age individual fish. Corroborate trout age as assigned by scales with age as assigned by otoliths (surface and cross-section read). Further corroborate trout age as assigned by bony structures with age as assigned by length frequency distributions. Use bony structures to back-calculate length-at-age and annual growth increment.

4. Ascertain degree of error identifying wild cutthroat, rainbow, and hybrid rainbow x cutthroat trout in the field using protein gel electrophoresis in the lab. Determine if hybridization is occurring, extent of genetic introgression, and if hybrids are sterile. Develop accurate methods to identify these two species and their hybrid in the field, including age 0 fish.

5. Develop effective methods to control expanding rainbow and hybrid trout populations. Explore reproductive phase of their life cycle by sampling in the spring.

6. Determine extent of recruitment to the riverine fishery (below Palisades Dam) from stocks in the reservoir, particularly hatchery and wild finespotted cutthroat trout. Explore factors affecting this recruitment such as extent of reservoir drawdown. Develop accurate methods to differentiate reservoir fish from riverine fish, and hatchery fish from wild fish.

7. Sample for whirling disease.

8. Conduct fully-randomized creel census as soon as funding is available.

9. Continue monitoring juvenile cutthroat trout outmigration from Rainey Creek, particularly during a “normal” water year. Estimate timing, sizes, and ages of juveniles outmigrating.

ACKNOWLEDGEMENTS

Fishery technician Rick Henderson (IDFG) and volunteers Ron Hover (TU), Steve Hyde, Dave Koehler (IDFG), and Mark Williams helped with electrofishing on the South Fork Snake River. Fishery bio aide Becky Lish (IDFG) entered electrofishing data and pressed fish scales. Ted Chu (IDFG) assisted in counting brown trout redds. Gary Dean (USFS), Ron Hover (TU), and Mary Louise Thompkins (TU) helped install the fry trap on Rainey Creek. Jay Weeks (IDFG) and volunteers from the local Upper Snake River Cutthroats Chapter (TU, FFF) operated the trap.

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APPENDICES

Appendix A Table 1. Trout species composition and relative abundance (%) at Palisades and Conant electrofishing sections, South Fork Snake RIver, September to October, 1982-1994. Total new fish captured during mark and recapture runs is in parentheses. Results are from MR4 database for all sizes of fish.

Year	WCT & HCT[c,d]	WRB & HYB[d]	BRN[d]	LKT[c,d]	KOK[c,d]	Total
Palisades						
1987[b]	62 (188)	6 (19)	31 (94)	0 (0)	0 (0)	99 (301)
1989	82 (824)	10 (97)	8 (84)	<1 (1)	0 (0)	100 (1006)
1991	71 (681)	22 (213)	6 (60)	<1 (1)	0 (0)	99 (955)
1994[e,k]	62 (572)	33 (307)	4 (38)	<1 (1)	0 (0)	99 (918)
Conant						
1982[a,f,j]	79 (181)	1 (2)	19 (44)	1 (2)	0 (0)	100 (229)
1986[f]	83 (1647)	2 (47)	14 (285)	<1 (4)	0 (0)	99 (1983)
1987[f,g,i]	86 (299)	2 (6)	12 (43)	0 (0)	0 (0)	100 (348)
1988	88 (1570)	3 (58)	9 (159)	<1 (1)	0 (0)	100 (1788)
1989	89 (2291)	4 (103)	7 (175)	0 (0)	0 (0)	100 (2569)
1990	84 (2978)	6 (216)	9 (335)	<1 (4)	0 (0)	99 (3533)
1991	80 (1646)	7 (150)	13 (259)	0 (0)	0 (0)	100 (2055)
1992[h]	83 (598)	5 (34)	12 (87)	0 (0)	0 (0)	100 (719)
1993	85 (1528)	6 (113)	9 (166)	0 (0)	0 (0)	100 (1807)
1994[g]	79 (867)	9 (100)	12 (136)	0 (0)	<1 (1)	100 (1104)

Appendix A Table 1. Continued.

[a] Only 1.9 km of larger 4.9 km section was electrofished.
[b] Electrofishing conducted during March.
[c] Believed to emigrate from Palisades Reservoir and numbers are directly related to extent of drawdown.
[d] WCT=wild cutthroat trout; HCT=hatchery cutthroat trout; WRB=wild rainbow trout; HYB=wild rainbow X cutthroat hybrid trout; BRN=wild brown trout; LKT=lake trout; KOK=kokanee salmon.
[e] Electrofishing conducted from Sheep Creek to Palisades Creek; section length reduced from 5.1 km to 5.0 km.
[f] Electrofishing conducted in early November.
[g] Only two marking and no recapture runs done due to low flows.
[h] Only one marking and no recapture runs done due to low flows.
[i] Only 3.2 km of larger 4.9 km section was electrofished with drift boat.
[j] From Moore and Schill (1984), not MR4 database.
[k] Only two marking and no recapture runs done due to high flows.

Appendix A Table 2. Range of flows, mean flow, and electrofishing sampling efficiencies (R/C) at the Palisades and Conant Sections, South Fork Snake River, 1986-1994. Flows were recorded at the USGS Irwin gage. Electrofishing results are from MR4 database for all sizes of fish.

Sampling Dates	Range of flows (cfs)	Mean flow (cfs)	WCT & HCT[a,c]				WRB & HYB[a]				BRN[a]				All[d]				
			M	C	R	R/C(%)	M	C	R	R/C (%)	M	C	R	R/C (%)	M	C	R	R/C (%)	Catch rate (fish/ day)[b]
Palisades																			
1987: 3/17, 18, 23	1030-1070	1050	115	81	8	10	7	13	1	8	68	28	2	7	190	122	11	9	104
1989: 9/20, 21, 28	5170-7000	6290	600	289	65	22	64	41	8	20	61	33	10	30	725	364	83	23	363
1991: 9/4, 5, 11	8130-8600	8440	504	235	58	25	150	67	4	6	52	14	6	43	706	317	68	21	341
[e,g]1994: 9/19, 20	6400-6420	6410	572	--	--	--	307	--	--	--	38	--	--	--	918	--	--	--	459
Conant																			
1986: 11/4, 5, 6, 7, 20	3540-3780	3590	1171	546	70	13	32	17	2	12	186	107	8	7	1393	670	80	12	413
[f,h]1987: 11/5, 6	869-941	905	299	--	--	--	6	--	--	--	43	--	--	--	348	--	--	--	174
1988: 10/3, 4, 11	3600-3710	3650	1101	567	98	17	41	18	1	6	115	48	4	8	1257	634	103	16	630
1989: 10/18,19, 27	2990-3060	3040	1424	1067	200	19	58	55	10	18	107	79	11	14	1589	1201	221	18	930
1990: 10/11,12, 18	3490-3690	3560	1768	1527	317	21	118	112	14	12	213	134	12	9	2102	1774	343	19	1292
1991: 10/7, 8, 15	4490-4790	4650	1159	627	140	22	105	54	9	17	158	120	19	16	1422	801	168	21	741

Appendix A Table 2. Continued.

Sampling Dates	Range of flows (cfs)	Mean flow (cfs)	WCT & HCT[a,c]				WRB & HYB[a]				BRN[a]				All[d]				
			M	C	R	R/C(%)	M	C	R	R/C (%)	M	C	R	R/C (%)	M	C	R	R/C (%)	Catch rate (fish/ day)[b]
[f]1992:10/ 14	--	2130	598	--	--	--	34	--	--	--	87	--	--	--	719	--	--	--	719
1993:10/13, 14, 21, 22	2620-3820	3210	998	630	100	16	78	41	6	15	110	66	10	15	1186	737	116	16	481
[f]1994: 10/7, 11, 14	1220-2440	1850	867	--	--	--	100	--	--	--	136	--	--	--	1104	--	--	--	368

[a] WCT = wild cutthroat trout; HCT = hatchery cutthroat trout; WRB = wild rainbow trout; HYB = wild rainbow x cutthroat hybrid trout; and BRN = wild brown trout.
[b] Includes recaptured fish; catch rate = (M+C)/number days.
[c] Hatchery cutthroat (finespotted) are believed to emigrate from Palisades Reservoir and numbers are directly related to extent of drawdown.
[d] Includes lake trout and kokanee salmon.
[e] Electrofishing conducted from Sheep Creek to Palisades Creek; section length reduced from 5.1 km to 5.0 km.
[f] No recapture runs due to low flows.
[g] No recapture runs due to high flows.
[h] Only 3.2 km of larger 4.9 km section was electrofished with drift boat.

Appendix A Table 3. Brown trout redd counts on the South Fork Snake River, 1979 to present.

Section	Distance (km)	12/11 1979	12/16 1980	12/4 1981	12/8 1982	12/20 1983[a]	12/4 1984	12/10 1985	12/5 1986	12/4 1987[b]	12/5 1988	12/18 1989[c]	12/7 1990	12/9 1991	1992[d]	12/13 1993	12/18 1994
Afterbay of Palisades	0.8	50	61	69	90	49	75	179	294	70	199	117	168	111	--	40	56
Afterbay - Irwin	11.2	0	0	0	0	0	51	143	29	2	15	0	7	0	--	0	20
Irwin - Conant Valley	15.8	6	45	7	4	4	8	65	46	103	8	106	12	207	--	126	22
Conant - Burns Creek	16.2	89	104	95	120	96	37	143	311	133	216	215	171	216	--	55	109
Burns Creek - Anderson Diversion	20.6	14	23	0	57	9	51	8	62	47	39	61	127	141	--	88	53
Anderson - Heise Bridge	5.6	4	0	0	0	0	7	5	0	7	2	0	0	0	--	0	0
Heise Bridge - Mouth	30.4	2	5	21	NC	NC	23	65	67	168	66	75	81	214	--	115	46
Totals	100.6	165	238	192	271	158	252	608	809	530	545	574	566	889	--	424	306

[a] Counts should be considered low due to poor visibility from fog. NC = not counted.
[b] Later flights indicated fish spawned later in 1987 than in previous years. On December 14 in the afterbay, 105 redds were counted versus 70 on December 4.
[c] Late counts due to weather cancellations. Fog at dam, ice below Lorenzo.
[d] Not done in 1992 due to weather cancellations.

Appendix B.

May 23, 1995

Presence of large spawning cutthroat trout in Rainey Creek, a tributary to the South Fork of the Snake River, Idaho

Report to Ron Hover

Trout Unlimited

Kevin A. Meyer

Jim S. Gregory

Department of Biological Sciences

Idaho State University

Pocatello, Idaho 83209

8 June 1994

Methods

On 6 - 7 June 1994 we conducted an initial survey of Rainey Creek to assess whether adult cutthroat trout from the South Fork of the Snake River use Rainey Creek as a spawning area. In order to cover the entire drainage on public land in a short period of time, we conducted spot-checks by walking the trail along the creek and entering the stream to look for adult fish and redds. We spot-checked areas in the mainstem above the Targhee National Forest boundary, and in the North and South Forks. The North Fork was checked from the confluence upstream to the upper trailhead, and the South Fork was checked from the confluence upstream approximately 1/2 mile. A backpack electroshocker was used to capture fish. Fish collected were measured to the nearest centimeter, and sexed if they were ripe.

The drainage was divided into four sections, the South Fork the North Fork, the main stem above the trailhead, and the main stem from the trailhead to the Forest boundary. The South Fork had the highest gradient, the lowest discharge, and in our opinion the least amount of potential spawning sites. The North Fork appeared to have a lower gradient, and contained more pools and potential spawning sites than did the South Fork. The upper main stem flowed through a braided channel with many potential spawning sites. Willows were abundant in the riparian zone. The lower main stem flowed through a single channel with some bank disturbance and few willows in the riparian zone. The gradient for both main stem sections appeared similar and lower than both forks.

Water temperature in the lower section ranged from 11^{o}C at midday to 13^{o}C in late afternoon. In the North Fork, temperature was 8^{o}C at midday.

Results

Adult fish were captured at all sampling sections. Thirty-eight cutthroat trout were captured and ranged from 13-43 cm (5-17 in) (Figure 1). Fifty-eight percent of these fish were ripe; 68% of those were males and 32% were females. Eight redds, some containing ova, were noted and probable redds were observed at numerous other locations.

In the South Fork, eight fish were captured, ranging from 13-39 cm (5-15 in). We observed four fish on a pocket of redds in one location. One other redd was observed. In the North Fork, eleven fish were captured, ranging from 20-42 cm (8-16.5 in). In the upper mainstem section we captured eight fish ranging from 23-43 cm {9-17 in). In the lower mainstem section we captured 12 cutthroat trout ranging from 13-42 cm (5-16.5 in) and one 10 cm {4 in) rainbow trout. One cutthroat trout in the lower section, 31 cm long, had an Idaho F&G jaw tag (RTN A12867) At the time this report was written the tagging location of this fish was unknown.

Discussion

We observed large cutthroat trout (>30 cm (12 in)) in Rainey Creek and therefore believe that fish are migrating from the South Fork of the Snake River to spawn in Rainey Creek. Moore (1980) surveyed Rainey Creek 14 years ago and found no cutthroat trout larger than 27.5 cm (11 in). Moore did not indicate during which part of the year his survey occurred. It is possible

that his survey was conducted when migrant spawners from the South Fork of the Snake River were not present. Migrant cutthroat trout trapped by Moore and Schill (1984) near the mouth of Pine Creek, a tributary adjacent to Rainey Creek, ranged in length from 25- 53 cm. Based on these studies we assume that 30 cm fish are probably migrants from the South Fork of the Snake River.

Further investigation into the history of the tagged fish is needed. If the tagged fish came from the South Fork of the Snake River then we have direct evidence that cutthroat trout from the Snake River are using Rainey Creek as a spawning area.

No formal population estimates were conducted. However, based on the number of fish we found and the stream length, we estimate that the drainage may contain roughly 250 cutthroat trout greater than 30 cm (12 in), with perhaps 100 of these being greater than 40 cm (16 in). Although we were not looking for juvenile cutthroat trout, our failure to collect any was unexpected and may indicate emigration from Rainey Creek during their first year of life.

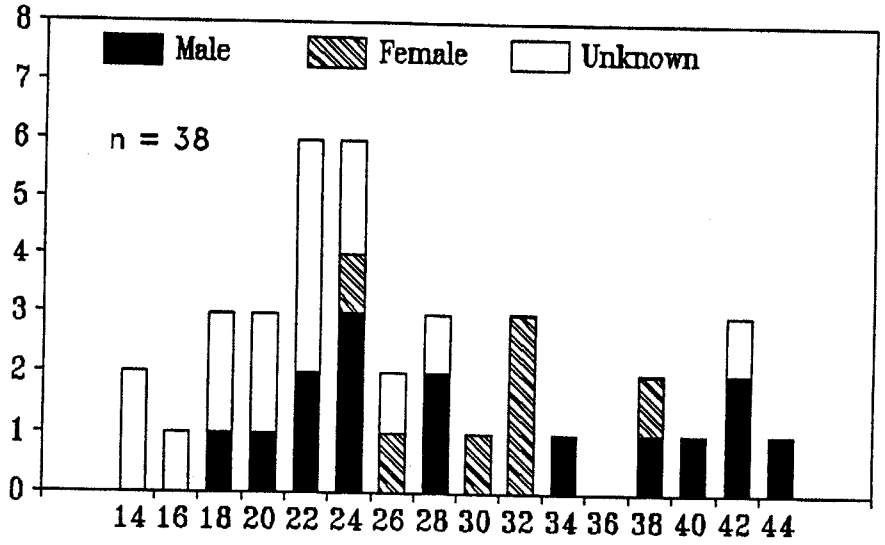

Figure 1. Length frequency for all cutthroat trout captured in Rainey Creek, Idaho, June 6-7, 1994. Numbers on the x-axis indicate length classes of fish from that point to two cm smaller.

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1994 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-19

Project I: Surveys and Inventories | Subproject I-G: Upper Snake Region

Job: c^2 - Henrys Fork Snake River, Birch Creek, Little Lost River | Title: Rivers and Streams Investigations

Contract Period: July 1, 1994 to June 30, 1995

ABSTRACT

We conducted a low-intensity postcard creel survey on the Upper Henrys Fork (Henrys Lake Outlet to the Mack's Inn reach of the Henrys Fork Snake River). Response rate was 18%, and anglers rated their day fishing as: Excellent (7%), Good (25%), Fair (25%), and Poor (43%).

A total of 750 wild rainbow trout *Oncorhynchus mykiss* were captured by electrofishing in late summer on the Upper Henrys Fork (Mack's Inn). Most of the catch was young-of-the-year and yearling individuals. We calculated a population estimate of 3,464 wild rainbow trout (≥152 mm total length) for the reach, or 962 fish per linear river mile, using the modified Peterson method.

A low-intensity effort survey on the Upper Henrys Fork revealed that only 52% of individuals using the river were fishing. This reach is heavily used by recreational boaters/floaters and is designated as a National Water Trail.

We conducted a low-intensity postcard creel survey on the Box Canyon reach of the Henrys Fork. Response rate was 26% overall and 33% for residents. Angling parties rated their days' fishing as: Excellent (11%), Good (23%), Fair (36%), and Poor (30%). Catch rates were 0.64, 0.87, and 0.53 fish/h for all, guided, and non-guided anglers, respectively. Guided trips made up 22% of the effort estimated by returned postcards.

A total of 1,226 wild rainbow trout were captured by electrofishing prior to the spring opener on the Box Canyon reach of the Henrys Fork. Fish ranged in size from 75 mm to 550 mm total length. We calculated a reach population estimate of 7,234 fish (3,014 fish per linear river mile) and 9,359 fish (3,900 fish per linear river mile) using modified Peterson and log-likelihood methods, respectively.

A total of 725 wild rainbow trout were captured by night electrofishing in early summer on the Last Chance reach of the Henrys Fork. Similar to Box Canyon, fish ranged in size from 75 mm to 550 mm total length. We calculated a reach population estimate of 1,521 fish (1,014 fish per linear river mile) and 1,988 (1,325 fish per linear river mile) using modified Peterson and log-likelihood methods, respectively.

A total of 269 wild rainbow trout were captured by night electrofishing in early summer on the Harriman State Park reach of the Henrys Fork. Like the Box Canyon and Last Chance reaches, fish ranged in size from 75 mm to 550 mm total length. We calculated a reach

population estimate of 1,199 fish (400 fish per linear river mile) using the modified Peterson method.

A total of 681 wild rainbow trout were captured by electrofishing in early summer on the Pinehaven to Riverside reach of the Henrys Fork. Fish ranged in size from 75 mm to 600 mm total length. We calculated a reach population estimate of 3,156 fish (1,435 fish per linear river mile) and 3,489 fish (1,586 fish per linear river mile) using the modified Peterson and log-likelihood methods, respectively.

We assisted the Bureau of Land Management personnel in conducting extensive fish population surveys for Birch Creek and the Little Lost River.

Author:

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Regional Fishery Biologist

METHODS

Henrys Fork Snake River

Upper Henrys Fork (Mack's Inn)

Postcard Creel Survey-We conducted a low-intensity postcard creel survey on the Upper Henrys Fork during the summer of 1994. Our objective was to gather information on angler catch rates, fish harvest, and angler satisfaction and demographics within the constraints of a limited budget and available manpower. Postcards were put on the windshields of all vehicles parked at Upper Henrys Fork access points on designated sampling days.

Electrofishing-Electrofishing on this reach was conducted in August and September 1994 using drift boat electrofishers, either one boat alone or two working together.

Effort Counts-We jointly conducted angler effort counts with the Henrys Fork Foundation. Our objective was to estimate the angling effort on this reach and to determine what proportion of users are actually angling. The reach was split into five (5) sections for the purposes of sample stratification and increased resolution and usefulness of the data.

Oral History-We assisted the Henrys Fork Foundation in developing an oral history survey questionnaire for long-time users of the Upper Henrys Fork.

Box Canyon

Postcard Creel Survey-We conducted a low-intensity postcard creel survey on the Upper Henrys Fork during the summer of 1994. The objective was to gather information on angler catch rates, fish harvest, and angler satisfaction and demographics within the constraints of budget and manpower limitations. Postcards were put on the windshields of all vehicles parked at Box Canyon access points on designated sampling days. Most results were tabulated using the Idaho Department of Fish and Game's creel survey program.

Electrofishing-We electrofished this reach in the usual pre-opener manner during the second and third weeks of May 1994. Two drift boat shockers were used simultaneously on marking and recapture runs. We usually made two runs each day: both banks the first run, and left and right channels the second run.

Last Chance

Electrofishing-We electrofished this reach at night during June 1994. Two people operated one drift boat shocker on marking and recapture runs.

Harriman State Park

Electrofishing-We electrofished this reach at night during June 1994. Two people operated one drift boat shocker on marking and recapture runs.

Pinehaven

Electrofishing-We electrofished this reach at night during June 1994. Two drift boat shockers were used simultaneously on marking and recapture runs. We usually made two runs each day: both banks the first run, and left and right channels the second run.

Birch Creek

Electrofishing

An electrofishing survey was conducted on Birch Creek by Bureau of Land Management personnel on August 25, 1994. The sampling concentrated on stream control reaches and reaches affected by the Birch Creek Hydro streambed liner.

Little Lost River

Electrofishing

An electrofishing survey was conducted on Big Creek, tributary to Wet Creek and the Little Lost River, by Bureau of Land Management personnel on August 11 and September 15, 1994. The sampling concentrated on stream reaches from the mouth of Big Creek upstream to the roadless area, both above and below the large beaver pond in the non-roaded stretch.

RESULTS AND DISCUSSION

Henrys Fork Snake River

Upper Henrys Fork (Mack's Inn)

Postcard Creel Survey-The return rate of postcard surveys on the Upper Henrys Fork was 18%, slightly lower than the 21% response rate at Island Park Reservoir (this report). Of 174 postcards distributed, only 32 were returned. Postcard survey respondents, when asked how they rated their fishing on the Upper Henrys Fork on the day of the interview, responded: Excellent (7%), Good (25%), Fair (25%) and Poor (43%). We expect the results to be somewhat biased toward successful anglers. The proportion of respondents who had actually fished was a surprising 71%. Most of the fish reported caught were rainbow trout *Oncorhynchus mykiss* ranging from 7 to 17 in total length, but typically from 8 to 11 in.

Electrofishing-A total of 1,867 new trout were sampled in this reach in late summer, 1994. Species composition and relative abundance were 40% wild rainbow trout, 1% fingerling rainbow trout, 13% hatchery rainbow trout, 34% brook trout *Salvelinus fontinalis*, 2% cutthroat trout *O. clarki*, 1% hybrid rainbow x cutthroat trout, and 8% kokanee *O. nerka kennerlyi* (migrating spawners).

A total of 750 wild rainbow trout were captured. Sampled fish were mostly young-of-year and yearlings with relatively few adult-sized fish. There are several possible reasons for the lack of large fish in the sample. First, this section of river may not support adult rainbow trout, at least if they have the choice to descend to Island Park Reservoir. Second, fish may be harvested before reaching adult size. Growth in this reach is moderate and not as great as in the Box Canyon reach. While it is possible that overharvest is a problem, it is less likely so than if we saw a similar size distribution in a reach with fast growth rates (e.g. Box Canyon).

Estimated abundance of wild rainbow trout ≥152 mm (6 in) was 3,464 for the reach, or 962 fish per linear river mile, using the modified Peterson method (Table 1). An estimate was not made by the log-likelihood method.

Effort Counts-An average of 55 people were on the river on any given day; 52% were fishing and 48% were non-consumptive users. Weekend days tended to have average pressure while weekdays varied the most. Organized groups of non-anglers floating the river using rented watercraft and/or a paid shuttle service probably accounted for most of this weekday variation.

Organized groups of non-anglers may have contributed to the discrepancy between instantaneous count (52%) and postcard survey (71%) proportions of users that were fishing. Since large organized groups were often dropped off at access points by outfitters, there was no vehicle available for placement of a postcard survey card. On this stretch of river, the postcard survey may have over-estimated the proportion of river users that were angling.

Table 1. Population estimates for wild rainbow trout captured by electrofishing on the Henrys Fork Snake River, 1994. Sample sizes by reach as follows: Mack's Inn (Upper Henrys Fork) N=746; Box Canyon N=1226; Last Chance N=725; Harriman N=269; Pinehaven to Riverside N=702.

	Estimated # WRBT ≥152 mm (6 in) in sampled sections		Length (miles) of:		Estimated # WRBT ≥152 mm	
Reach name	Modified Peterson method	Log-likelihood method	Sampled section	Entire reach	Per/river mile by MPM (LLM)	Per reach
Upper Henrys Fork	2,718	--	3.6	3.6	755	2,718
Box Canyon	7,976	9,359	1.5	1.6	3,323 (3,900)	9,304
Last Chance	1,158	1,988	1.5	1.6	772 (1,325)	1,235
Harriman State Park	659	1,976	3.0	5.4	220 (659)	1,188
Pinehaven to Riverside	3,218	--	2.2	2.7	1,463	3,950

Oral History-The oral history documented increased user pressure, declining fishing, and declining habitat values through the latter half of the 20th century. The report is on file in the Upper Snake Region office and with the Henrys Fork Foundation.

Box Canyon

Postcard Creel Survey-The return rate of postcard surveys on Box Canyon was 26%, greater than the 21% rate at Island Park Reservoir (this report) and the 18% rate at Mack's Inn (Upper Henrys Fork). However, of 298 postcards distributed, only 78 were returned. Postcard survey respondents, when asked how they rated their fishing in Box Canyon on the day of the interview, responded: Excellent (11%), Good (23%), Fair (36%) and Poor (30%). We expect the results to be somewhat biased toward successful anglers. Catch rates of rainbow trout for all anglers were 0.64 fish/hr or 0.87 and 0.53 fish/hr for guided and unguided anglers, respectively. Guided trips made up 22% of the fishing effort accounted for by returned postcards.

Electrofishing-A total of 1,387 new trout were sampled in this reach. Species composition and relative abundance were 88% wild rainbow trout, 1% hatchery rainbow trout, 5% hybrid rainbow x cutthroat trout, and 6% brook trout.

A total of 1,226 wild rainbow trout were sampled in this reach. Fish sampled had a wide distribution of total length from 3 to 22 in. The distribution is skewed from the norm for fish populations by having a larger mode of adults (up to and including those of trophy size) than of young-of-year or yearlings. This could be due partly to dip net mesh size being too large to capture fish smaller than about 5 in on some of the runs. More likely, adult spawners are

strongly attracted to spawning habitat in this reach and are blocked by an impassable dam at the upper end.

Estimated abundance of wild rainbow trout ≥152 mm (6 in) was 7,234 fish using the modified Peterson method and 9,359 fish using the log-likelihood method (Table 1). This equates to 3,014 and 3,900 fish per mile, respectively. These estimates are far greater than any other reach of the Henrys Fork above Riverside Campground, perhaps because of sampling shortly after the spawning season. These estimates, while higher than the record low years of 1989 and 1991, are a slight decrease from fall, 1993. A decline would be expected if a large proportion of the 1993 estimate were fish released from the reservoir during the fall 1992 drawdown and salvage operation.

Further analysis needs to be done using time series methods to determine if sampling and analysis methods were consistent in the past. If not, correction factors can be applied to standardize results.

Last Chance

Electrofishing-A total of 725 individual wild rainbow trout were sampled in this reach. Similar to Box Canyon, fish sampled in this reach had a wide distribution of size of 3-22 in. However, very few large trout were sampled (almost none in the 11-13 in and few in the 10-15 in range). This may be due to the difficulty of sampling in this reach. Also, the mode of small (presumably yearling) fish is skewed about two in shorter than any other reach sampled between Island Park Dam and Riverside Campground. Are some of these fish young-of-year, and are yearlings rearing in other reaches at this time of year? Or is it sample variation? Hopefully these questions will be answered in the next four years by our research project conducted by Montana State University.

Estimated abundance of wild rainbow trout ≥152 mm (6 in) was 1,521 fish using the modified Peterson method and 1,988 fish using the log-likelihood method (Table 1). This equates to 1,014 and 1,325 fish per mile, respectively. These estimates are similar to those for Mack's Inn (Upper Henrys Fork).

Harriman State Park

Electrofishing-A total of 269 individual wild rainbow trout were sampled in this reach. Similar to the reaches upstream of Harriman State Park but below Island Park Dam, fish sampled had a wide distribution of total length from 3 to 22 in. However, few fish were sampled between 10 and 15 in. Like all reaches sampled below Island Park Reservoir, this may indicate a poor or failed 1992 year class. Where these fish recruit from is unknown. Age structures (scales) have been collected but not analyzed; they may provide additional insight on interpreting length frequency distributions from these river reaches.

Estimated abundance of wild rainbow trout ≥152 mm (6 in) was 1,199 for the reach, or 400 fish per mile, using the modified Peterson method (Table 1). An estimate was not made using the log-likelihood method. This is the lowest rainbow trout estimate of all Henrys Fork reaches sampled in 1994. It is possible that sampling problems contributed to this low estimate

or that the reach sampled (the uppermost 56% of the Harriman State Park reach) is not representative of the entire reach. Electrofishing this reach has been historically difficult.

Pinehaven

Electrofishing-A total of 681 individual wild rainbow trout were sampled in this reach. Much like the other reaches discussed, fish sampled in this reach had a wide distribution of total length from 3 to 24 in. However, few fish were sampled between 10 and 15 in.

Estimated abundance of wild rainbow trout ≥152 mm (6 in) was 3,156 fish using the modified Peterson method and 3,489 fish using the log-likelihood method (Table 1). This equates to 1,435 and 1,586 fish per mile, respectively. These estimates are greater than any reach sampled in 1994 except Box Canyon, where estimates were about twice as large. However, this reach is most similar to Box Canyon in terms of habitat. Like Box Canyon, this reach was also sampled with high effort per unit of stream area.

Birch Creek

Electrofishing

Results of the electrofishing survey are not reported in this document but will be kept on file in the Upper Snake Region and Bureau of Land Management offices.

Little Lost River

Electrofishing

Results of the electrofishing survey are not reported in this document but will be kept on file in the Upper Snake Region and Bureau of Land Management offices.

1994 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fisheries Management F-71-R-19

Project II: Technical Guidance Subproject II-G: Upper Snake Region

Contract Period: July 1, 1994 to June 30, 1995

ABSTRACT

Technical guidance was provided to federal, state, county, municipal, and private agencies/entities upon request. Technical guidance was also provided to organized sportsmen's groups, conservation organizations, and private citizens in the form of fish pond development, stocking and management advice, funding requests and project feasibility opinions, and various conservation and educational programs.

Regional fishery management personnel contributed over 120 man-days to technical guidance requests in 1994.

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1994 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fisheries Management F-71-R-19

Project III: Habitat Management Subproject III-G: Upper Snake Region

Contract Period: July 1, 1994 to June 30, 1995

ABSTRACT

Significant efforts were made to protect and enhance fish habitat in the Henrys Fork River. Regional personnel participated in the Island Park Hydro Advisory Committee, both in monitoring impacts of operations and especially in the planning stages of the proposed Fall River Rural Electric Cooperative spillway modification (collar). Regional personnel also provided technical assistance for fish passage at the Buffalo River hydro plant, and significant gains were made with responsible and affected entities toward project implementation.

Riparian exclusion fence was built on one-half mile of Kelly Spring Creek, one mile of Howard Creek, and one-third mile of Targhee Creek, tributaries to Henrys Lake.

A cooperative stream habitat survey was conducted with The Nature Conservancy (TNC) staff for the Henrys Lake Outlet channel on the newly acquired TNC Flat Ranch property. A total of seven monitoring sections were established to assess fish abundance and species composition, pool/riffle ratios, width/depth profiles, substrate characteristics, bank stability, bank shading, and riparian vegetation type.

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METHODS AND RESULTS

Riparian exclusion fencing was built on two miles of Kelly Spring July 5-6, one mile of Howard Creek and on one-third mile of Targhee Creek from July 25 to 29. The fence on all three sections was 3-strand high tensile electric fence. Fencing was installed utilizing volunteer and Department personnel to enhance spawning and rearing habitat along Henrys Lake tributaries.

Surveying was completed on a diversion structure on Howard Creek to install a fish ladder to enhance fish passage to upper Howard Creek below Highway 87. The Department Engineering Bureau used laser surveying equipment and C.A.D. to design the fish ladder.

A cooperative stream habitat assessment was completed on the Henrys Lake Outlet channel July 17-22 in cooperation with The Nature Conservancy between the North Fork Reservoir Company Dam and the southern boundary of the Flat Ranch, recently acquired by The Nature Conservancy. A total of seven monitoring sections were established for the assessment. A minimum of 10 equally spaced transects were completed for each of the seven sample reaches along with characterization of channel and bank conditions.

Electrofishing of selected reaches and tributaries was done with two backpack shockers in one pass to obtain initial estimates of species composition, age structure and densities.

Reach parameters consisted of pool/riffle ratios based on overall length. Transect parameters included width/depth profiles, flow measurements for each reach, substrate characteristics based on percent of width across transect and pool complexity.

Bank characteristics included bank stability, undercut bank as a percent of bank length, shading as a percent of bank length and bank vegetation type.

1994 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fisheries Management F-71-R-19

Project IV: Population Management Subproject IV-G: Upper Snake Region

Contract Period: July 1, 1994 to June 30, 1995

ABSTRACT

An attempt was made to salvage fish below Mackay Reservoir, but the effort was aborted due to sufficient leakage through both the dam and temporary cofferdam constructed by the Big Lost River Irrigation District. Until repairs are made to remedy this background leakage, salvage operations will be unnecessary even at zero-managed flow through the dam.

At Palisades Reservoir, approximately 3,500 game fish, including cutthroat trout *Oncorhynchus clarki*, rainbow trout *O. mykiss*, brown trout *Salmo trutta*, lake trout *Salvelinus namaycush*, and mountain whitefish *Prosopium williamsoni*, were salvaged from the three dewatered stilling basins and released in the river below. A new method of transporting the fish with the assistance of the Bureau of Reclamation personnel made the operation much more efficient and safe than in the past,and should set a standard for future salvage operations at this site.

Regional personnel and local anglers transferred 61 largemouth bass *Micropterus salmoides*, 76 bluegill *Lepomis macrochirus*, and incidental yellow perch *Perca flavescens* from the Southeast Region waters to Mud Lake in a joint effort to further bolster the Mud Lake fishery after the 1993 winterkill.

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